PROJECT MANUAL

FOR:

2022 CAPITAL BOND IMPROVEMENTS – PHASE 5a
At the
WAVERLY ELEMENTARY SCHOOL

EASTCHESTER UNION FREE SCHOOL DISTRICT
TOWN OF EASTCHESTER, WESTCHESTER COUNTY

NEW YORK STATE EDUCATION DEPARTMENT NUMBER:

WES - S.E.D. No. 66-03-01-03-0-002-012

B.B.S. PROJECT NUMBER:

25-139A

BID DATE:

NOVEMBER 5, 2026

BBS

ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

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ARCHITECTS CERTIFICATION

THE UNDERSIGNED CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION, AND BELIEF, THE PLANS AND SPECIFICATIONS ARE IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE NEW YORK STATE ENERGY CONSERVATION CONSTRUCTION CODE, THE CONSTRUCTION STANDARDS OF THE EDUCATION DEPARTMENT, NEW YORK STATE DEPARTMENT OF LABOR RULE 56, EPA AND AHERA REQUIREMENTS.

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John Prentice, A.I.A. Lic. No. 029824

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PROJECT DIRECTORY

Architects/Engineers:	BBS Architects, Landscape Architects and Engineers, P.C. 244 East Main Street Patchogue, NY 11772 (631) 475-0349 (631) 475-0361 Fax
Superintendent of Schools:	Dr. Alison Villanueva (914) 793-6130
Assistant Superintendent for Business:	Linda Carlin (914) 793-6130
Director of School Facilities and Operations:	Elliot Sheldon (914) 793-6130
District Counsel:	Guercio & Guercio, LLP 77 Conklin Street Farmingdale, NY 11735 (516) 694-3000 (516) 694-4738 Fax
Construction Manager:	Arris Paul Tozzi (845) 473-3600 pjtozzi@arriscontracting.com

Invitation to Bidders

BOARD OF EDUCATION
Eastchester Union Free School District

PUBLIC NOTICE: is hereby given for separate and single prime contract sealed bids for: **2022 Capital Bond Improvements, Phase 5a at Eastchester UFSD.** Bids will be received by the School District, on **November 5, 2026** at **11:00 a.m.** in the **Administration Building, 580 White Plains Road, Eastchester, New York, 10709**, and at said time and place publicly opened and read aloud.

Beginning **October 5, 2026,** the Contract Documents may be examined at the Office of the Architect, **BBS Architects, Landscape Architects and Engineers, P.C., 244 East Main Street, Patchogue New York, (631-475-0349)**. Complete digital sets of Contract Documents may be obtained online as a download for a **non-refundable fee of One-Hundred ($100.00) Dollars** at the following website: bbs.biddyhq.com. Optionally, in lieu of digital copies, hard copies may be obtained through **Biddy c/o Lohrius Blueprint, 226 Newtown Road, Plainview, NY 11803 (516-465-2880)** upon a **deposit of One-Hundred ($100.00) Dollars** for each complete set. **Checks for deposits shall be made payable to the EASTCHESTER UNION FREE SCHOOL DISTRICT** and may be uncertified. All bid addenda will be transmitted to registered plan holders via email and will be available at the above referenced websites. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs. Plan holders who have obtained hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use, and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda. The bid deposit for hard copies will be returned upon receipt of plans and specifications, in good condition, within thirty days after bid date, except for the lowest responsible bidder, whose check will be forfeited upon the award of the contract.

A non-mandatory pre-bid site walk through is scheduled for October 19, 2026, at 4:00 pm, at Waverly School.

The Contract will be awarded to the lowest responsible bidder or the proposals will be rejected within 45 days of the date of opening proposals. Bids shall be subject, however, to the discretionary right reserved by the School District to waive any informalities, accept or reject any alternatives, reject any proposals and to advertise for new proposals, if in its opinion the best interest of the School District will thereby be promoted.

Each bidder may not withdraw his bid within 45 days after the formal opening thereof. A bidder may withdraw his bid only in writing and prior to the bid opening date.

By Order of:
The Board of Education
Eastchester Union Free School District

Dated: **October 5, 2026**

SECTION 013300 - ELECTRONIC SUBMITTAL PROCEDURES

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
   1. Contractor's construction schedule.
   2. Submittal schedule.
   3. Daily construction reports.
   4. Shop Drawings.
   5. Product Data.
   6. Samples.
   7. Quality assurance submittals.

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
   1. Permits.
   2. Applications for Payment.
   3. Performance and payment bonds.
   4. Insurance certificates.
   5. List of subcontractors.

C. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section " Payment Procedures" specifies requirements for submittal of the Schedule of Values.
   2. Division 1 Section " Project Management and Coordination" specifies requirements governing preparation and submittal of required Coordination Drawings.
   3. Division 1 Section "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
   4. Division 1 Section "Quality Requirements" specifies requirements for submittal of inspection and test reports.
   5. Division 1 Section "Closeout Procedures " specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.3 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
   1. Preparation of Coordination Drawings is specified in Division 1 Section " Project Management and Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

      I. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
   3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

      1. Submittals must be transmitted in accordance with the requirements of Section 1.6.
      2. Allow between 8 - 10 business days for initial review of the first round of submittals. See 1.6 for more information. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
      3. If an intermediate submittal is necessary, process the same as the initial submittal.
      4. Allow an additional 5 business days for reprocessing each resubmittal.
      5. No extension of Contract Time will be authorized because of contractor's failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
      6. **If the contractor delays on key submittals which can negatively impact the project schedule, the owner and his agent(s) can withhold payments as necessary until the proper submittal paperwork is received.**

B. Submittal Preparation:
   1. Each copy of each submittal will have a "submittal cover sheet" attached identifying all information requested by Architect. (see copy after this section) All SCS must be approved by contractor (see electronic stamp B.5) signed, dated and have all fields completely filled-out. Any submittal received without proper use of this Cover Sheet will be returned immediately to the contractor. Cover sheet for contractor's use is included at the end of this section.
   2. A Submittals Website, an internet (web-based) service shall be used by all contractors to provide an on-line database and repository which shall be used to transmit and track project related documents. The Submittals Website is provided by the Construction Manager. Upon Contract award the successful bidders will be given log on instructions. The intent for using the Submittals Website is to expedite the construction process by

reducing paperwork, improving information flow, and decreasing submittal review turnaround time.

3. Project submittals (shop drawing, product data and quality assurance submittals) shall be transmitted by the Contractor in Portable Document Format (PDF) to the Submittals Website, where it will be tracked and stored for retrieval for review. After the submittal is reviewed it is uploaded back to the Submittals Website for action or use by the Contractor and Owners Representatives.
4. The service also tracks and stores documents related to the project such as RFI's (Request for Information), Contacts, Meeting Minutes, Punchlist, and Non-Compliance Notices.
5. For each submittal, the Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents, including verification of manufacturer/product, dimensions and coordination of information with other parts of the work. (contractor sign and date)
6. It is the Contractor's responsibility to provide the submittals in a PDF format. The contractor may use any of the following options:
    a. Subcontractors and suppliers provide paper submittals to the Contractor, who electronically scans and converts them to PDF format.
    b. Contract a Scanning Service, which will allow the Contractor and the Contractor's subcontractors and suppliers to provide paper submittals to the Scanning Service, which electronically scans and converts them to PDF format. It will be the Contractor's responsibility to transmit the scanned submittals to the Submittals Website.
7. Image Quality:
    a. Image resolution: The PDF files shall be created at a minimum resolution of 200 dots per inch utilizing the original document size. The Contractor will be responsible to increase the resolution of the scanned file or images being submitted as required to adequately presenting the information.
    b. Image Color Rendition: When information represented requires color to convey the intent and compliance, provide full color PDF reproduction.

C. Contractor Internet Service and Equipment Requirements:
1. The Contractor will be required to have an Email address and Internet access at Contractor's main office.
2. Unless the Contractor will exclusively be using a Scanning Service to create all PDF documents, the Contractor will be required to own a PDF reviewing, creating and editing software, such as Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF reviewing, creating and editing software for applying electronic stamps and comments.
3. The Contractor will be required to have a web browser such as Internet Explorer 11, Firefox 40-60.
4. The Contractor will be required to have Adobe Reader version 11: Sage uses a pdf creator to generate forms. In order to print / view forms you will need Adobe Reader.
5. Contractors are required to have network securities in place such as anti-virus that is active and up to date. Do not access Contract Management from unsecured or public network location such as free WI-FI hotspots.

D. Training and Support:
I. A training manual shall be available, free of charge from the Construction Manager, for all project participants regarding use of the Submittals Website and PDF submittals.

2. Training if required, will be provided by the Construction Manager via Zoom. The appropriate personnel from each contractor office are required to attend this meeting.

E. Paper Copies:
1. Contractor Copies: The Contractor will be responsible for making copies, for the Contractor's own use and for use by its subcontractors and suppliers.

F. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the CM electronically using a transmittal form. The CM will then transmit to the Architect. The Architect will not accept submittals received from sources other than the Construction Manager.
1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
2. Transmittal Form: Use AIA Document G810 and submit Sage notification to ACCI that the submittal has been uploaded. The contractor's transmittal must have the subject description properly filled out, so that all parties can see what section/product is being submitted without having to open the actual submittal.
3. Transmittal Form: Use the sample form at the end of this Section for transmittal of submittals.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Distribution: It is the contractor's responsibility to coordinate submittals with each subcontracting trade. Each contractor shall be required to provide their subcontractors with a complete list of their submittals in order that other contractors can request required submittal information.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.6 SUBMITTAL SCHEDULE

A. Submittals must be prepared and transmitted as follows, unless otherwise approved by the Construction Manager:
1. Within 15 working days after Notice to Proceed:
    1. HVAC Units (UV, VRF, CU, ACCU, EF, etc.)
    2. Aluminum Windows, Entrances. Storefronts, FRP & Glass
    3. Boiler, Breeching and Flue Liner at Bedford Hills
    4. Light Fixtures, Site Lighting Poles
    5. Panelboards & Switchgear
    6. Doors & Hardware
    7. Hot Water heaters and Booster Pumps
    8. All other submittals critical to the schedule.
2. Balance of Submittals – after 15 days but within 30 days after Notice to Proceed.
3. If the contractor misses the milestone submittal timeframes listed above, the owner / agents can withhold requisition payments until the required paperwork is received**. If there are any open submittals beyond 45 days of contract award, the owner will stop all contractor payments until all missing paperwork is received.**

4. Upon approval by the Construction Manager, non-critical submittals may be transmitted later.
5. Prepare submittals including information in paragraph 1.4B above.

B. Schedule Updating: Revise the submittal schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.7 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at the site, and submit one copy to the Architect and one copy to the Construction Manager by 10:00 am the following day. Contractor not submitting required reports will not receive approval on the subsequent application for payment until such time that all required information is submitted:
1. List of subcontractors at the site.
2. Count of personnel at the site (substantiates payroll).
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and startups.
13. Partial Completions, occupancies.
14. Substantial Completions authorized.

1.8 SHOP DRAWINGS

A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches.

7. All Technical Submittals: Electronic shop drawing submittal to Construction Manager.
8. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

9. Maintain approved copies on site to record “as-built” conditions.
10. Submit additional copies of as-built, approved drawings as specified in project closeout.

1.9 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Submit prior to shop drawings or simultaneously when products are specified items or A/E approval is granted. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following that are not required, mark copies to indicate the applicable information. Include the following information:

    1. Manufacturer's printed recommendations.
    2. Compliance with trade association standards.
    3. Compliance with recognized testing agency standards.
    4. Application of testing agency labels and seals.
    5. Notation of dimensions verified by field measurement.
    6. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Submit digitally through the Submittals Website to CM.
4. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

    1. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
    2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.10 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern. Sample are submitted directly to the architect’s home office and copy Construction Manager with transmittal.

1. Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample. Include the following:

    1. Specification Section number and reference.
    2. Generic description of the Sample.
    3. Sample source.
    4. Product name or name of the manufacturer.
    5. Compliance with recognized standards.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

    1. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
    2. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
    3. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
    4. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
3. Preliminary Submittals: Submit a full set of choices where Samples are required for selection of color, pattern, texture, or similar characteristics from a range of standard and premium choices.

    1. The Architect will review and distribute selections made or other action.
4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 6 sets to the Architect who will distribute one set to CM and two (2) to the contractor marked with the action taken.
5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

    1. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
    2. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.

    1. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.11 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
   1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control."

1.12 ARCHITECT'S ACTION

A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.
   1. Compliance with specified characteristics is the Contractor's responsibility, as stated on the approval stamp.

B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
   1. Unsolicited Submittals: The Architect will return unsolicited submittals to the sender without action.
   2. Final Unrestricted Release: When the Architect marks a submittal "Furnish as Corrected", the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
   3. Final-But-Restricted Release: When the Architect marks a submittal "Make Corrections Noted", the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance. (No resubmittal is required.)
   4. "Revise and Resubmit" When the Architect marks a submittal " Revise and Resubmit", do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay.
   5. Returned for Resubmittal: When the Architect marks a submittal "Rejected", do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark.

      I. Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress.
   6. Other Action: Where a submittal is for information or record purposes only and does require approval and the contractor is responsible for the conformance of the product, the Architect will return the submittal marked "Reviewed".
   7. "Submit specified item": When submittal is marked "Submit Specified Item", the Contractor shall immediately submit the specified item,

EXECUTION (Not Applicable)

END OF SECTION 013300

SECTION 01 78 36 – WARRANTIES

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
   1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section "Submittals" specifies procedures for submitting warranties.
   2. Division 1 Section "Closeout Procedures" specifies contract closeout procedures.
   3. Divisions 3 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.
   4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Contractor is responsible for warranties related to its contract.

1.2 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.

   The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective

Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
   1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence of entities required.

1.4 SUBMITTALS

A. Submit written warranties to the Architect and Construction Manager prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the architect.
   1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect and Construction Manager within 15 days of completion.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect and Construction Manager, for approval prior to final execution.
   1. Refer to Divisions 3 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. **Warranties must be job-specific from the manufacturer and reference this project.** Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

   1. See "Closeout Procedures" and "Checklist for Project Closeout" for additional information.
   2. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION 017836

INSTRUCTIONS TO BIDDERS

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1. DOCUMENTS (ISSUANCE AND RESTRICTIONS)

A. Bid documents may be examined at the applicable office of the Architect, BBS Architects, Landscape Architects & Engineers, P.C., 244 East Main Street, Patchogue New York between the hours of 9 a.m. and 4 p.m. daily except Saturdays, Sundays, and holidays.

B. A deposit, refundable in accordance with the Invitation to Bidders, is required for each set of Bid Documents.

C. Bid documents are comprised of: Instruction to Bidders, Form of Proposal, Contract Forms and Conditions, Addenda issued prior to bid date, and General and Technical requirements of the specifications and drawings.

2. QUALIFICATIONS OF BIDDERS

Bidders will be required to present documentation attesting that they:

A. Have financial capability to produce and execute the project within the time periods specified.

B. Possess a minimum of five (5) years continuous experience as a firm doing business under the same name, engaged principally as a contractor for the work proposed.

C. Have completed at least five similar projects, listing type and scope of work, names and addresses of owners and dates of contract completion. The District has the right to verify the documentation as well as examine other aspects of the bidder's work record.

D. Can provide tabulation of equipment and facilities at their disposal to do this work.

E. Have a current bonding capacity to accommodate proposed work.

F. Have the experienced staff and technical organization for the project.

G. Maintain an office with full-time employees in a commercial space.

H. Intend to complete at least 25 percent of the Work with their own forces. General Conditions, Mobilization, etc. shall not count toward the 25 percent.

I. The Contractor and each Subcontractor must have a minimum of five (5) years experience in the work and/or applicable trade they will provide with their own forces.

J. The Bidder is not currently involved in bankruptcy proceedings.

K. The Bidder is licensed to perform the work they are bidding on in the jurisdiction the work will take place.

L. It has the insurance required by the Contract Documents to protect the Owner or is able to obtain the required insurance.

M. The bidder shall provide a complete Schedule of Values on an AIA form G703. Said Schedule shall be revised and resubmitted until satisfactory to the Architect. All project phases, activities and work items shall be broken out individually with lines for both labor and materials. In addition to this and to the required retainage, the Schedule of Values must be structured with the following minimum values:

General Conditions:	5% of overall contract value
Bonds and Insurance:	4% of overall contract value
Submittals:	1% of overall contract value
Punch List:	3% of overall contract value
Commissioning (if applicable):	TBD based on specific project
Closeout and O&M Manual:	2% of overall contract value

N. The Bidder is required to complete and submit the “Statement/Proof of Bidder’s Qualifications” form contained herein.

O. It is assumed that in preparing this bid, the Bidder has already compiled this information, and that it is being made available for reference with completing this package. All information contained above must be submitted to the Architect prior to award of contracts. Failure to provide this information may result in disqualification of bidder.

3. COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

A. Bidder must comply with applicable federal, state, and local laws as well as all ordinances, rules, and regulations affecting work.

B. The provisions of General Municipal Law, Section 103A, as it relates to refusal to testify or sign a waiver of immunity against prosecution and the submittal of bids and transactions with the State of New York, or a political subdivision thereof, governs work under this contract.

C. Wage rates as determined by the New York State Industrial Commissioner pursuant to the labor laws of the State of New York apply to all work under this contract.

D. In accordance with the requirements of General Municipal Law § 103-g, the Bidder is required to include with its bid either (1) the “Certification of Compliance with the Iran Divestment Act” or in the case where the bidder is unable to make such certification, (2) the form entitled “Declaration of Bidder’s Inability to Provide Certification of Compliance with the Iran Divestment Act.”

E. In accordance with the requirements of Section 220-i of the New York Labor Law, all contractors and sub-contractors submitting bids or performing construction work on public work projects or

private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder is required to include with its bid "Labor Law Section 220-i Certification" and include a copy of the Certificate(s) of Registration issued by the Commissioner of the Department of Labor for the bidder and each of its sub-contractors.

4. SINGLE PRIME CONTRACTS

A. Where the project cost does not exceed $1,500,000 and the Owner has decided to solicit bids from one general contractor, the Bidder must submit with its bid a separate sealed list that names each subcontractor that the Bidder will use to perform Work on the Contract, and the agreed-upon amount to be paid to each, for: (A) plumbing and gas fitting; (B) steam heating, hot water heating, ventilating and air condition apparatus and (C) electric wiring and standard illuminating fixtures.

B. After the low bid is announced, the sealed list of subcontractors submitted with such low bid shall be opened and the names of such subcontractors shall be announced, and thereafter any change of subcontractor or agreed-upon amount to be paid to each shall require the approval of the public owner, upon a showing presented to the public owner of legitimate construction need for such change, which shall be open to public inspection.

5. EXAMINATION OF DOCUMENTS AND SITE

A. Bidder shall visit sites of proposed work and be fully familiarized with conditions as they exist, as well as the character of the operations to be carried on under the proposed contract.

B. Bidder shall make all necessary on-site investigations so as to understand facilities, difficulties, and restrictions attending the execution of the work including access to and conditions of the work sites and properties.

C. Bidder shall examine and be familiar with the documents and forms delineating the work of the contract.

D. Failure to receive or to examine any instrument, document, or to perform appropriate site investigations shall in no way relieve the bidder of responsibility for proposed contract for the consideration set forth in his bid.

6. AMBIGUITIES, INTERPRETATIONS, AND ADDENDA

A. No oral interpretations, instructions, or explanation of the bid documents will be given prior to the opening of the bids. Discrepancies, ambiguities, or doubts as to the intent of the bidding document should be communicated to the Architect in writing for interpretation.

B. Interpretations of, clarifications of, amendments to or corrections to the Bid Documents will be made in writing in the form of addenda forwarded to each person to whom or each entity to which Bid Documents have been issued and will become part of the Bid Documents. Each Bidder must acknowledge receipt on the Bid Proposal Forms. Replies issued in any other manner will not be binding. The Architect will not be responsible for oral clarifications.

7. PRE-BID CONFERENCE

A. When indicated in the Invitation to Bidders, a pre-bid conference will be held, at which time the Architect will have a representative available to compile any questions regarding the bid documents. No oral interpretations or answers to questions will be given at the pre-bid conference. All questions requiring a response, as determined by the District and the Architect, will be issued in writing in the form of an Addendum. Bidders shall not rely upon any oral response(s) to any questions raised at the pre-bid conference.

B. Addenda responding to pertinent questions or concerns raised at the pre-bid conference, requiring modification of the bid documents, will be issued for the record and become part of the bid documents.

C. Notice as to the time and place of the pre-bid conference is stated in the Invitation to Bidders.

8. BASIS OF BID – PERFORMANCE AND QUALITY STANDARDS

A. GENERAL: To establish performance and quality standards for the products, materials, and equipment required in the work, the Contract Documents detail performance criteria, or specify two or more items or materials which are presumed to be equal. This method of establishing a level of quality is not intended to exclude products that are equivalent in quality, performance, appearance, and function to those specified.

B. EQUIVALENTS: The Bidder, at any time, may propose to use in the work an equivalent item in lieu of that specified with NO CHANGE to the Bid Amount. The Bidder, proposing to utilize this equivalent procedure, shall provide a detailed descriptive submission of the proposed material, equipment, or method being offered as equal to those specified, including an explanation of all deviations from the product specified in the Contract Documents. The Bidder is responsible to prove equality and, in that regard, shall supply all additional information requested by the Architect, as well as pay for any required testing to support these claims. Further, the Architect is to be the sole judge of product equivalency for the purpose intended, considering equality, workmanship, aesthetics, services, maintenance, economy, and reliability of operation.

If the Contractor has used equivalents as the basis of the bid, the “Proposed Equivalent Form”, which is included in the Project Manual following the Bid Proposal Form, shall be submitted as an attachment to the Bid Form or within 72 hours after the bid or prior to the award of the contract. This form may be reproduced, if necessary, for a full listing of equivalents to be considered. This does not exclude the Bidder from submitting equivalents after the award of contract. The intent of this process is that, if the Bidder is already aware of an equivalency submission, the risk of acceptance can be reduced by verifying equivalency and, therefore, the bid price prior to award. The risk of whether proposed equivalents are accepted is borne by the Bidder.

If an equivalent is accepted, the Bidder must coordinate the installation of the equivalent and make all associated changes required. The Bidder also waives any claim for additional cost or contract time associated with the equivalent which becomes apparent before, during, or after installation. The Bidder agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the equivalent.

C. SUBSTITUTIONS: For consideration by the Owner, the Bidder may propose to use in the work substitute items in lieu of those specified, which do not meet the project performance and quality criteria, and can be furnished and installed at a reduced cost (credit) to the Owner with no impact on the work being done by others.

1. Proposed substitutions must be submitted with the bid or within 72 hours after the bid or prior to the award of the contract, on the Proposed Substitution Form, which is in the Project Manual following the Proposed Equivalent Form. The Bidder must list any and all deviations from the Contract Documents as well as the corresponding credit amount to be deducted from the Base Bid Proposal if the substitution is accepted by the Owner. This does not exclude the Bidder from submitting a substitution for consideration after the award of Contract.

2. Substitutions cannot be used as the basis of the bid, they must be listed separately and will be evaluated on a case by case basis. All base bid amounts must be based on the specified materials or acceptable equivalents.

3. In no way will the proposed substitutions influence the successful bidder selection process.

Substitutions may not be used to arrive at the lowest qualified bid amount.

4. If a substitution is accepted, the Bidder must coordinate the installation of the substitute and make all associated changes required. The Bidder also waives any claim for additional cost or contract time associated with the substitute which becomes apparent before, during, or after installation. The Bidder agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution.

9. PREPARATION, IDENTIFICATION, AND SUBMISSION OF PROPOSAL

A. Bidders shall submit triplicate copies of Form of Proposal (one marked 'Official Tender' and others marked 'Copy'), properly signed and completed in every respect as per these Instructions to Bidders, in an opaque, sealed envelope plainly and prominently marked:

"Sealed Bid for (Project Name) _____

Bid Date _____, 20___, by (Name/Address of Bidder)."

B. Attached to the Form of Proposal envelope, Bidders shall submit a separate and sealed envelope clearly marked 'Bid Security,' which shall contain copies of the 'Bid Security,' as called for in these Instructions to Bidders. The name and address of the Surety Company providing the Bid Bond shall be written on the outside of the envelope containing the Bid Security.

C. All bids shall be held for a period of forty-five (45) days after their receipt and opening, during which time the Owner has the right to enter into a contract, and the bid securities of the three (3) lowest responsible bidders shall be held until the execution of the Contract.

D. The Owner reserves the right to waive any irregularities in the submission of bids. Once the Form of Proposal has been submitted in the sealed envelope, there shall be no alterations or amendments; external markings or separate supplementary information shall, in no way, affect the sealed bid information. Any necessary adjustment to the proposal shall be made prior to its submission and shall be part of the enclosed sealed bid.

E. A bidder may withdraw his bid, either in person or by telegraphic or written request, at any time prior to the scheduled closing time for the receipt of bids. Negligence on the part of the bidder in preparing his bid confers no right for the withdrawal of the bid after it has been opened.

10. BID SECURITY

A. Proposal must be accompanied by bid security of not less than ten percent (10%) of the amount of bid, which may be a certified check, cashier's check, bank draft, or bid bond executed by a Surety Company authorized to do business in the State of New York and made payable to the Owner.

1. Bid Security shall be submitted in a separate sealed envelope clearly identifying the company and project as well as the name and address of the Surety Company.

2. Each bond must be accompanied by a Power of Attorney, giving names of Attorneys-in-fact, and the extent of their bonding authority. All bonds shall be countersigned by a resident Agent and with a Surety Company or Corporation meeting the following qualifications:

a. Surety must be licensed to do business in the State of New York.

b. Surety shall be listed on the current U.S. Treasury Department Circular 570 entitled "Companies Holding Certificates of Authority" from the Secretary of the Treasury under the Act of Congress approved July 30, 1974 (6 U.S.C., Sec. 6-13), as Acceptable Sureties on Federal Bonds.

c. Surety must meet minimum rating requirements as published in current "Best's Key Rating Guide" as listed below:

1) For contracts not exceeding $250,000, the following shall apply for all bonding companies holding a certified guarantee agreement form, the Small Business Administration (a copy of said agreement must accompany the bond).

Contract Amount	Financial Size Category	Policy Holder Rating
$0-(But not including) $100,000	Class VI	B
$100,000 - (But not including) $250,000	Class VIII	B

2) On all other bonds, the Surety shall be rated as equal to "A" or better as to "Policy Holder Ratings" and "XI" or better as to "Financial Size Category" by "Best's Key Rating Guide."

3) Limitations:

a) Bonding limits or bonding capacity refers to the limit or amount of bond acceptable on any one project.

b) The bonding limit for each contractor shall not exceed the amount listed on the above referenced U.S. Treasury Department List for the Surety issuing the bond.

4) All Surety companies are subject to approval and may be rejected by the Owner without cause, in the same manner that bids may be rejected.

5) Compliance: In the event any of the requirements outlined herein are not complied with, the Owner shall have the right to reject the bid or annul the Award of the Contract.

B. Bid security will be returned to all except the three lowest bidders, after formal analysis and evaluation of bids. No bid will be withheld beyond the forty-five (45) day period stipulated above.

C. Remaining bid security will be returned to bidders after Owner and successful bidder have executed the Agreement and the Owner has received and approved performance and payment bonds.

D. If the required agreement has not been executed within the specified period of time after the bid opening, bid security of any bidder will be returned upon his request, provided he has not been notified of acceptance of his bid prior to the date of his request.

11. RECEIPT AND OPENING OF BIDS

A. Bids will be received up to the time and at the location indicated for the opening in the Invitation to Bidders, after which they will be visibly opened and read aloud, and the contents made known to all interested parties present.

12. MODIFICATION OR WITHDRAWAL OF PROPOSAL

A. Bid may not be modified after it has been deposited with Owner.

B. Bid may not be withdrawn after time set for receipt of bids.

C. Withdrawn bid may not be resubmitted.

D. Bid withdrawn after opening of bids will result in forfeiture of bid security.

13. DISQUALIFICATION OF PROPOSAL

A. The Bidder acknowledges the right of the Owner to reject any or all bids.

B. Bid may be disqualified and rejected under any or all of the following conditions:

1. If the Bidder fails to furnish the required bid security, or to submit data required by the Contract Documents, or if the Bid is in any way incomplete or irregular.
2. If the Bid has not been deposited at the designated location prior to the date and time for receipt as indicated in the Bid Advertisement of these "Instructions to Bidders".
3. If there is reason to believe that a bidder has submitted more than one bid for the same project.
4. Or, if there is reason to believe that collusion exists among the bidders.
5. Failure to establish to Owner's satisfaction:

a. Proof of ownership, control, or ability to procure necessary plant and equipment to commence the work at the time prescribed and thereafter prosecute and complete at the rate, or within the time specified.
b. That he is not already obligated by prior commitment to other work as to likely delay start, prosecution, or completion of the work required by the contract.
c. That he proposes to use reliable and responsible subcontractors or suppliers.

14. AWARD OF CONTRACT

A. The contract will be awarded to the lowest qualified responsible bidder, provided his bid is reasonable and it is in the best interest of the Owner to accept.

B. Owner may determine the lowest bid by adding one base bid to other base bid(s) and/or by adding to or deducting from those base bid(s), additive or deduct alternates, or substitutions, if any, which the Owner elects to accept after the opening of bids.

15. EXECUTION OF CONTRACT

A. Form of Agreement as prepared by Owner shall be Standard Form of Agreement between Owner and Contractor, A.I.A. Form A132.

B. Contracts shall be executed in triplicate within ten (10) days after notification of award at which time the successful contractor shall deliver to the Owner all the necessary counterparts of the Contract in the form set forth in the Bid and Contract Documents.

C. Performance and payment bonds shall be submitted in the form of A.I.A. Document A312, covering performance as well as labor and material payment and extended for the period of time stipulated in Article 11 of the General and/or Supplementary General Conditions, "Bonds and Insurance". An executed bond must be issued by surety company licensed in New York State.

D. At the time of execution of the Contract and prior to the start of construction operations, the successful bidder shall furnish Certification of Insurance in the form and amounts stipulated under the section of the specification describing insurance requirements.

E. Schedule of Values, as per A.I.A. Form G703, provide breakdown of costs.

16. TAXES AND PERMITS

A. Material purchased for use in the construction of buildings owned by the State, County, municipality, or political subdivision are exempt from Federal excise and State sales taxes when such materials are incorporated into and become part of the completed improvement.

B. Materials, appliances, tools, equipment, or fuel costs which do not become part of the completed improvement will be subject to all applicable taxes.

C. The Owner is not subject to Federal Tax on transportation of property.

D. Local Building Permit will not be required.

E. Exemption certificates will be furnished by Owner for purchases of materials where material is to be incorporated into work, upon receipt of a copy of the supplier's invoice showing items, net prices, and federal excise tax separately.

17. SUBCONTRACTOR'S LISTING

A. For multiple prime contracts, a listing of all subcontractors and major material suppliers (including address, telephone number, and name of individual to contact) whose services are proposed to be employed on the project shall be submitted within 15 days after signing of the contract.

18. TIME OF COMPLETION

A. Bidder shall agree to start work on **June 29, 2026,** and complete within the number of calendar days specified in the Form of Proposal. Project must be completed by **August 21, 2026.**

B. Restrictions, if any, applicable to construction activities in the Owner's facilities as a result of State, Federal or Local orders, laws, regulations or rules, and the duration of any such restrictions, the Owner may modify the construction schedule, including the anticipated start date, set forth in the Contract/Bid Documents. By submitting a bid, the Bidder consents to any such schedule modification and further acknowledges and agrees that there shall be no additional compensation for schedule modifications caused directly or indirectly by such restrictions. The Bidder further acknowledges and agrees that the sole remedy for any schedule modifications or delays caused directly or indirectly by such restrictions shall be an extension of time, to be determined in the sole discretion of the Owner.

19. CONDITIONS OF WORK OPERATIONS

A. Work under Contract shall be executed and pursued without interruption of or interference with the school operations.

B. Work operations, access to buildings, and extent of movement of personnel within buildings shall be coordinated with and limited by School Authorities.

C. Contractor shall notify School Authorities at least 24 hours in advance to advise of intended work operations to be scheduled and receive approval prior to starting work.

20. REQUIRED BID INFORMATION

A. In addition to any other information/documentation required by these Instructions to Bidders or other Bid Documents, the following information/documentation must be submitted with each bid to be considered a complete and responsive bid. Failure to include any required document in the bid submission may lead to disqualification or rejection of a bid, at the sole discretion of the Owner.

1. Bid Proposal Form
2. Proposed Equivalent Form
3. Proposed Substitution Form
4. List of Subcontractors – Provide in a sealed envelope along with bid. (If a Single Prime Contract - See Paragraph 4(A) of these Instructions to Bidders).
5. Iran Divestment Act Forms (Certification of Compliance or Declaration of Inability), signed and notarized.
6. Statement of Bidder's Qualifications
7. Sexual Harassment Prevention Certification
8. Labor Law Section 220-i Certification and NYS DOL Certificates of Contractor Registration
9. Bid Bond/Security
10. Information/documentation required by Paragraph 2 of these Instructions for Bidders and the Statement/Proof of Bidder's Qualifications Form.

END OF SECTION

DRAFT

AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

The Waverly School
45 Hall Ave.
Eastchester, NY 10709

THE OWNER:
(Name, legal status, address, and other information)

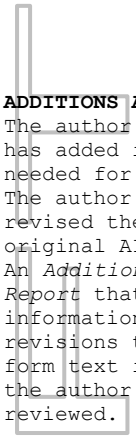
Eastchester Union Free School District
580 White Plains Road
Eastchester, NY 10709

THE ARCHITECT:
(Name, legal status, address, and other information)

BBS Architects, Landscape Architects & Engineers, P.C.
244 E. Main Street
Patchogue, NY 11776

THE CONSTRUCTION MANAGER:

Arris Contracting Company, Inc.
189 Smith Street
Poughkeepsie, New York 12601

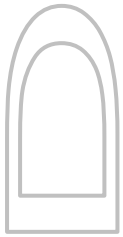


ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.



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DRAFT

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents, apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, including all required allowances, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bidder has evaluated and satisfied itself as to the conditions and limitations under which the Work is to be performed, including without limitation (1) the location, condition, layout and nature of the Project site and surrounding areas, (2) generally prevailing climatic conditions, (3) anticipated labor supply and costs, and (4) availability and cost of materials, tools and equipment;
- **.6** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.7** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

§ 2.2 It is understood and agreed that the Bidder has, by careful examination, satisfied itself as to the nature and location of the Work, and confirmation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work under the proposed Contract Documents.

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§ 2.3 No official, officer or agent of the Owner is authorized to make any representations as to the materials or workmanship involved or the conditions to be encountered and the Bidder agrees that no such statement or the evidence of any documents or plans, not a part of the Bidding Documents, shall constitute any grounds for claim as to conditions encountered. No verbal agreement or conversation with any officer, agent or employee of the Owner either before or after the execution of this Contract shall affect or modify any of the terms or obligations herein contained.

§ 2.4 The Bidder acknowledges its understanding and agreement that it has informed itself fully as to the conditions relating to construction and labor under which the Work will be performed and agrees as far as possible to employ such methods and means in the performance of its work so as not to cause interruption or interference with any other contractor.

§ 2.5 The Bidder's attention has been directed to the fact that all applicable state laws, municipal ordinances, and rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they are deemed to be included in the Contract Documents the same as though herein written out in full. By submitting a Bid, the Bidder acknowledges that if awarded the Contract it shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified in the Contract Documents. By submitting a Bid, the Bidder acknowledges that if awarded the Contract it shall be required to observe all laws and ordinances including, but not limited to, relating to the obstructing of streets, maintaining signals, keeping open passageways and protecting them where exposed to danger, and all general ordinances affecting it, its employees, or its work hereunder in its relations to the Owner or any person. By submitting a Bid, the Bidder acknowledges that if awarded the Contract it shall also obey all laws and ordinances controlling or limiting the Contractor while engaged in the prosecution of the Work under the Contract.

§ 2.6 The Bidder's attention has been directed to the fact that if the Contractor observes that the Drawings and Specifications are at variance with laws and regulations, it shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided in the Contract Documents for changes in the Work. By submitting a Bid, the Bidder acknowledges that if awarded the Contract and it performs any Work knowing it be contrary to such laws, ordinances, rules, regulations, or specifications, or local, state or federal authorities without such notice to the Architect, it shall bear all costs arising therefrom.

§ 2.7 The Bidder's attention is directed particularly to the Contract Documents provisions whereby the Contractor will be responsible for any loss or damage that may occur to the Work or any part thereof during its progress and whereby the Contractor must make good any defects or faults in the Work that may occur during the progress or within two (2) years after its acceptance. The Contractor shall provide for the continuation of the Performance Bond as a Maintenance Bond for two (2) full years after date of final payment request at the full Contract Sum. The Work is to be performed and completed to the satisfaction of the Owner & Architect and in accordance with the Specifications annexed hereto and the Drawings referred to therein.

§ 2.8 The Bidder's attention is directed to the fact that each Contractor shall pay not less than the minimum hourly wage rates on those contracts as established in accordance with Section 220 of the Labor Law as shown in the schedule included in the Bidding Documents. Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, provides (among other things) that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workers and mechanics employed on public work projects, including supplements for welfare, pension, vacation and other benefits. These supplements include hospital, surgical or medical insurance, or benefits; life insurance or death benefits; accidental death or dismemberment insurance; and pension or retirement benefits. If the number of supplements provided by the employer is less than the total supplements shown on the wage schedule, the difference shall be paid in cash to the employee. Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, also provides that the supplements to be provided to laborers, workers and mechanics upon public work, "... shall be in accordance with the prevailing practices in the locality..." The amount for supplements listed on the enclosed schedule does not necessarily include all types of prevailing supplements in the locality, and a future determination of the Industrial Commissioner may require the Contractor to provide additional supplements. The original payrolls or transcripts shall be preserved for three (3) years from the completion of the Work on the awarded project by the Contractor. The Owner shall receive such payroll record upon completion of the Project.

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§ 2.9 To be considered qualified, the Bidder must demonstrate to the Owner's satisfaction the following:

.1 The corporation, partnership, sole proprietorship of other business entity in whose name the Bid is submitted has been in business, continuously, for no less than the previous five (5) years performing or coordinating the work which it is bidding on;

.2 The Bidder has satisfactorily completed no less than five (5) projects of comparable size, complexity and type to this Project, within the last five (5) years, as a prime contractor to project owner;

.3 The Bidder is not currently involved in bankruptcy proceedings.

.4 The Bidder is licensed to perform the work it is bidding on in the jurisdiction where the work will take place;

.5 The Bidder is capable of and intends to perform at least 25% of the Work with its own forces. For the purposes of the preceding sentence any part of the work performed by supervisory personnel (persons above level of foreman) or by office personnel shall not be considered part of the Work performed by the Contractor's employees. Furthermore, such items as bonds, certificates, shop drawings and similar items are not to be counted as satisfying the twenty-five (25%) percent requirement;

.6 The Bidder is able to perform the Work with manpower available to it; and

.7 The Bidder and its subcontractors have a minimum of five (5) years' experience in the Work and applicable trades and will provide a qualified full time non-working Superintendent onsite.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders may obtain Bidding Documents as designated in the Advertisement or Invitation to Bid, for the deposit sum and method stated therein.
(Paragraphs deleted.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within thirty (30) days following the award of the Contract or the rejection of the Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.
Good condition as used in this section means that the Bidding Documents must be returned bound as issued, legible, and containing only the markings necessary for bidding purposes.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use for any other purpose is conferred by distribution of the Bidding Documents.

§ 3.1.6 All materials submitted as part of the bid shall become the property of the Owner and will not be returned to the Bidder. The Bidder is responsible for making its own copies of any or all parts of the Bid Documents for its files.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall consider federal, state and local Laws and Regulations and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing via email and shall be received by the Architect at least three working days prior to the date for receipt of Bids:

John Prentice
AIA Senior Associate, Architecture
Email: prentice@bbsarch.com
BBS Architects, Landscape Architects & Engineers, P.C.
244 E. Main Street
Patchogue, NY 11776

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With a copy to:

Emails: admin-eastchester@arriscontracting.com
Arris Contracting Company, Inc.
189 Smith Street
Poughkeepsie, NY 12601

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner, including phone calls, shall not be binding, and Bidders shall not rely upon them.

§ 3.2.4 In the absence of an interpretation, correction or change, should the Drawings disagree in themselves or with the Specifications, the better quality, the costlier or the greater quantity of work or materials shall be estimated upon, and unless otherwise ordered, shall be furnished.

§ 3.2.5 Communications regarding the Bidding Documents shall be directed to:

John Prentice
AIA Senior Associate, Architecture
Email: prentice@bbsarch.com
BBS Architects, Landscape Architects & Engineers, P.C.
244 E. Main Street
Patchogue, NY 11776

With a copy to:

Emails: admin-eastchester@arriscontracting.com
Arris Contracting Company, Inc.
189 Smith Street
Poughkeepsie, NY 12601

§ 3.2.6 Equivalents

§ 3.2.6.1 In the Specifications, if two or more kinds, types, brands, or manufacturers or materials are named, they shall be regarded as the required standard of quality, and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, manufacturer or material other than those named in the Specification, he shall indicate in writing to the Architect and Owner, and prior to the award of Contract, what kind, type, brand or manufacturer is included in the Base Bid for the specified item. Refer to Specification 012519 Equivalents for Equivalent Certification Form.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect no later than ten days prior to the date for receipt of Bids. Requests shall be submitted in the manner established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; (4) all supporting data including technical information, catalog cuts, warranties, installation instructions, operating procedures, significant qualities of proposed substitution (e.g. performance,weight,

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size, durability and visual effects); (5) samples, if applicable and requested; and (6) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.2.4 By making a request for substitution, the Bidder:

- **.1** represents that a representative of it has personally investigated the proposed substitute product and has determined that it is equal to or superior in all respects to that specified;
- **.2** represents that the warranty for the substitution will be the same, or greater than, that applicable to the specified product;
- **.3** certifies that the cost data is complete and includes all related costs under the Contract to be awarded, including professional services necessary and/or required for the Architect to implement the proposed substitution and waives any and all claims for additional costs related to the substitution which subsequently become apparent;
- **.4** represents that it will coordinate the installation of the accepted substitute, making all such changes to the Drawings effected by the change and to all Specifications as required for the work to be completed in all respects;
- **.5** shall submit an affidavit stating that (a) the proposed substitution conforms and meets all the requirements of the pertinent Specifications and the requirements shown on the Drawings and (b) the Bidder accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect; and
- **.6** represents the proposed substitution will have no effect on the construction schedule.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents through the print method stated in the Advertisement or Invitation to Bid.

All Bid Addenda will be transmitted to registered plan holders via email and will be available at www.revplans.biddyhq.com.

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

§ 3.4.5 The failure of any Bidder to receive any such Addenda will not relieve the Bidder of any obligation contained in the Addenda. Any Addenda issued shall become part of the Bidding Documents and Contract Documents.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

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§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.7 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.1.8 In accordance with the Wicks Reform 2008, for Single Prime Contracts for projects under the monetary threshold of $1,500,000, the bid shall be accompanied by a separate sealed envelope naming each subcontractor for the Plumbing, HVAC and Electrical work, and providing the amount to be paid to such subcontractors. After the low bid is announced, the sealed list of subcontractors submitted with such low bid will be opened and the names of such subcontractors shall be announced. Thereafter, any change of subcontractor or agreed-upon amount to be paid to each subcontractor shall require the approval of the public owner that is based on the Bidder or Contractor demonstrating to the public owner a legitimate construction need for the change sought, which demonstration shall be open to public inspection. Legitimate construction need includes a change in the Project specifications, a change in material costs, a change to subcontractor status as determined pursuant to NY Labor Law Section 222(2)(e), or the subcontractor has become otherwise unwilling, unable or unavailable to perform the subcontract. Once the low bidder's list is opened, it must be open for public inspection. The sealed lists of subcontractors submitted by all other bidders shall be returned to them unopened after the contract award.

§ 4.1.9 Pursuant to Section 220-i, each Bidder must provide proof of their registration with the Department of Labor of the State of New York at time of Bid opening, which proof must, at a minimum, include their certificate of registration. Failure to include proof of their registration may disqualify their bid from consideration for award and may result in rejection of their bid as nonresponsive.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security: Bid Security of not less than five percent (5%) of the total Base Bid (including all allowances) plus the sum of all alternates, in the form of a Bid Bond or a Certified Check made payable to the Owner.

Either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to five percent (5%) of the total amount of the Bid, and payable to the "Eastchester Union Free School District." This amount shall be the measure of liquidated damages sustained by the Owner as a result of the failure, negligence or refusal of the Bidder to whom the Contract is awarded to execute and deliver the Contract. The Bid must also be accompanied by a certified statement that the bonding company meets or exceeds the requirements set forth in Article 11 of the General Conditions of the Contract for Construction in the proposed Contract Documents.

§ 4.2.2 Except as stated under Section 4.4.3 hereof, the Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid, with the understanding that the Bid Security shall guarantee that the Bidder will not withdraw its Bid for a period of forty-five (45) days after the scheduled closing time for the receipt of Bids, and that if its Bid is accepted, the Bidder will enter into a formal contract with the Owner in accordance with the terms stated in the Bid and will furnish any required performance and payment bonds at the time required. In the event of the withdrawal of said Bid within the forty-five (45) day period or the failure of the successful Bidder to enter into the Contract with the Owner or the failure of the successful Bidder to furnish required performance and payment bonds at the time required, the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty, which represents the damage the Owner incurred as a result of the Bidder's default.

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§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Bid Securities shall be returned to all Bidders except the three (3) lowest Bidders within three (3) days after the formal opening of bids. The remaining Bid Securities will be returned within forty-eight (48) hours after the Owner and the successful Bidder have executed the Contract and executed performance and payment bonds have been approved by the Owner. If a Contract has not been executed or performance and payment bonds have not been approved by the Owner within forty-five (45) days after the scheduled closing time for the receipt of bids, and the Bidder notifies the Owner that its bid is withdrawn and requests return of its Bid Security, then the Bid Security will be returned by the Owner within three (3) days after the request for its return unless the Bid Security has been forfeited under § 4.2.2.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in the same sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid, subject to any modification of such date, time and place included in any Addenda. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. The Bidder assumes the risk of any delay in the mail or in the handling of the mail by employees of the Owner and the employees of the mail or delivery service used.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within three days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect and Owner, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be returned.

§ 4.4.4 Unless a Bid error complies with Section 4.4.3, a Bid may not be modified, withdrawn or canceled by the Bidder for a period of forty-five (45) days following the time and date designated for the receipt of Bids, and each Bidder agrees to this requirement in submitting a Bid.

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ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available for the Project. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests. The responsibility of Bidders and of their proposed subcontractors will be considered in making the award. The Owner, through the Architect and Construction Manager, may make such investigation as the Owner deems necessary to determine the responsibility of any Bidder or to determine the ability of any Bidder to perform the Work.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

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ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

§ 6.1.1 The Owner shall have the right to take such steps as it deems necessary to determine the ability of the Bidder to perform its obligations under the Contract, and the Bidder shall furnish the Owner all such information and data for this purpose as the Owner may request. The right is reserved to reject any Bid where an investigation of the available evidence or information does not satisfy the Owner that the Bidder is qualified and capable to carry out properly the terms of the Contract. The issuing of Bid Documents and acceptance of the Bidder's payment by the Owner shall not be construed as pre-qualification of that Bidder. If the Bidder is later discovered to have misrepresented or provided false or incorrect information with regard to any material party of the information submitted to the Owner, including but not limited to information regarding experience, debarment, claims, lawsuits, arbitrations, mediations, finances, license, contract termination, the Owner reserves the right to reject the Bid of such Bidder and, if a construction contract has been awarded, it will become automatically voidable at the sole discretion and election of the Owner.

§ 6.1.2 Within forty-eight (48) hours after the Bids are opened, the two (2) apparent low Bidders for each Prime Contract must submit the required pre-award submittal package described below to the Construction Manager via email:

- **.1** Workforce and Work Plan – Provide a detailed written Work Plan which shall demonstrate the Contractor's understanding of overall Project scope.
- **.2** Sequential listing of specific Project activities required to successfully complete the Work of the Contract Documents.
  - **.1** Include Schedule and list Critical Milestones.
  - **.2** Include phasing of the Work, if required.
  - **.3** Include listing of long lead items.
  - **.4** Statement the Project can be completed in the established time.
- **.3** Resumes for the Bidder's proposed supervisory staff, including qualifications for specialized expertise or any certification(s).
- **.4** Any special coordination requirements with other trades.
- **.5** Any special storage and/or staging requirements for construction materials.
- **.6** Detailed Cost Estimate: A copy of a Detailed Cost Estimate outlined in CSI format by material and labor.
- **.7** A copy of the Bidder's two (2) most recent financial statements audited by a CPA or, if the Bidder has no audited financial statements, then the two (2) most recent financial statements prepared and/or reviewed by a CPA.

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.8 A properly completed and executed AIA Document A305™-2020, Contractor's Qualification Statement.
.9 Required insurance certificates.
.10 A designation of the Work to be performed by the Bidder's own forces.
.11 Names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each.
.12 Names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.
.13 Names, addresses and phone numbers of the subcontractors that the Bidder proposes to use on the Project;
.14 A description of the Bidder's experience with at least five similar projects (completed in the last five years) of comparative size, complexity and cost together with documentary evidence showing that said projects were completed to their respective owner's satisfaction and were completed in a timely fashion listing type and scope of work. Provide names, addresses and current phone numbers of owners, architect and Construction manager associated with each project.
.15 The Bidder's proposed site safety plan.
.16 Proposed list of submittals and a proposed schedule for making and issuing them, within the Bidder's proposed work plan and schedule;

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 Intentionally omitted

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect, Construction Manager and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect or Construction Manager will notify the Bidder if either the Owner, Construction Manager or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner, Construction Manager or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner, Construction Manager and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner, which may be provided through the Construction Manager.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 The Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 The cost of the bonds shall be included in the Bid.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies licensed and admitted to do business in New York State and lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall each be equal to one hundred (100) percent of the Contract Sum and shall be increased if and when the Contract Sum is increased by any Modification (as defined in AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as revised for this Project) issued after award of the Contract.

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than ten (10) days after the Bidder has received notice of the acceptance of its Bid but in no event shall bonds be delivered later than the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond and shall contain the following modifications in a rider to each bond or stated in the Modifications section of each bond (Section 16 of the Performance Bond and Section 18 of the Payment Bond):

.1 The Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Any addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder and notice to the Surety of such matters is hereby waived.

.2 Notwithstanding any prior provision of this bond, the Surety also agrees that no meeting is required to be offered, arranged or held with the Owner, Contractor and/or Surety prior to termination of the Contract or the Contractor. The Surety agrees that it is obligated under the bonds to any successor, grantee, or assignee of the Owner

.3 Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner, and the Owner shall have fourteen (14) days from receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within fourteen (14) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first class postage prepaid, to the Owner.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, as revised for this Project and completed for the Contractor.

.2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds as revised for this Project.

.3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as revised for this Project.

.4 Not used.

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.5 Drawings

Number	Title	Date
Project Manual Section 000115	List of Drawings	

.6 Specifications

Section	Title	Date	Pages
Project Manual Section 000110	Table of Contents		

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract: Document Title

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

« Advertisement or Invitation to Bid
Instructions to Bidders
Contractor's Bid Form
Contractor's Payment and Performance Bonds
Insurance Certification Form »

ARTICLE 9: SAGE PROJECT CENTER REQUIREMENTS

§ 9.1 After notification of selection for the award of the Contract, the Bidder shall be required to use the SAGE Project Center for the transfer of Submittals, Shop Drawings and RFI's. There will be no exceptions to this requirement. The Contractor will be given a Login and Password free of charge.

ARTICLE 10: TAXES

§ 10.1 The Owner is an organization, which is exempt from New York State and Local Sales and Use Taxes. Materials purchased for use in fulfilling this Contract will be exempt from New York Sales Tax. The Owner will provide the Contractor with a completed Form ST-119.1, Exempt Organization Certification. The Contractor shall present a copy of this Form and a completed Form ST-120.1, Contractor Exempt Purchase Certificate, to each supplier.

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INFORMATION AVAILABLE TO BIDDERS

BBS Architects, Landscape Architects & Engineers, P.C. (BBS), accepts no responsibility for information contained within the items listed below that have been provided by others.

Any questions concerning information contained within these items shall be forwarded via the standard Request for Information process. BBS will forward these Requests for response by the appropriate party.

A. Construction Manager Special Provision – Prepared by Arris Contracting Company, Inc., 189 Smith Street, Poughkeepsie, NY 12601, 845-473-3600. Document follows this section.

B. Pre-Construction Survey, Bulk Sampling and Analysis of Suspect Asbestos Containing Materials – Prepared by Quality Environmental Solutions & Technologies, Inc. 1376 Route 9, Wappingers Falls, NY 12590 845-298-6031. Document follows this section.

C. Pre-Construction Lead Materials Inspection and Sampling – Prepared by Quality Environmental Solutions & Technologies, Inc. 1376 Route 9, Wappingers Falls, NY 12590 845-298-6031. Document follows this section.

D. Pre-Construction PCB Inspection and Sampling – Prepared by Quality Environmental Solutions & Technologies, Inc. 1376 Route 9, Wappingers Falls, NY 12590 845-298-6031. Document follows this section.

END OF SECTION

EASTCHESTER UNION FREE SCHOOL DISTRICT BID PROPOSAL FORM

2022 CAPITAL BOND IMPROVEMENTS, PHASE 5a at the WAVERLY SCHOOL

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

TELEPHONE NUMBER: _____ **DATE OF BID:** _____

The bidder mentioned above declares and certifies:

First: That said bidder is of lawful age and the only one interested in this bid, and that no one other than said bidder has any interest herein.

Second: That this bid is made without any previous understanding, agreement, or connection with any other person, firm, or corporation making a bid for the same purpose, and is in all respects fair and without collusion or fraud.

Third: That no member of the Board of Education of the **Eastchester Union Free School District,** Town of **Eastchester, New York**, nor any officer or employee or person whose salary is payable as a whole or in part from the treasury of said Board of Education is directly or indirectly interested in this bid or in the supplies, materials, equipment, work, or services to which it relates, or in any portion of the profits thereof.

Fourth: That said bidder has carefully examined the Instruction to Bidders, schedules, and specifications prepared under the direction of the Board of Education, and will, if successful in this bid, furnish and deliver at the prices bid and within the time stated, all materials, supplies, apparatus, goods, wares, merchandise, services, or labor for which this bid is made.

Fifth: Single Prime Contracts: Where the project cost does not exceed $1,500,000 and the Owner has decided to solicit bids from one general contractor, the Bidder shall submit with its bid a separate sealed list that names each subcontractor that the bidder will use to perform work in the contract, and the agreed-upon amount to be paid to each, for: (A) Plumbing and gas fitting; (B) Steam heating, hot water heating, ventilating and air condition apparatus and (C) Electric wiring and standard illuminating fixtures.

After the low bid is announced, the sealed list of subcontractors submitted with such low bid shall be opened and the names of such subcontractors shall be announced, and thereafter any change of subcontractor or agreed-upon amount to be paid to each shall require the approval of the public owner, upon a showing presented to the public owner of legitimate construction need for such change, which shall be open to public inspection.

Sixth: That the prices quoted are exclusive of all federal, state, and municipal sales and excise taxes.

Seventh: The undersigned further declares that he has received and examined the following addenda:

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Clarification No. _____ Dated: _____

Clarification No. _____ Dated: _____

FOR PROPOSAL FORM TO BE VALID, ALL PAGES OF THE PROPOSAL FORM MUST BE DULY EXECUTED.

Eighth: The Bidder shall check here __ if the bid has been based upon equivalents in lieu of any kind, type, brand, or manufacturer of material other than those named in the specifications. If checked, the Bidder shall submit the Equivalency Form in accordance with Instructions to Bidders, Paragraph 8B. This item in no way prohibits the Bidder from submitting equivalents after the award of contract.

Ninth: The undersigned further understands and agrees that he is to furnish all labor, materials, equipment, supplies, and other facilities and things necessary and required for the execution and completion of:

2022 CAPITAL BOND IMPROVEMENTS, PHASE 5a at THE WAVERLY SCHOOL

in strict accordance with the contract documents:

BASE BID GC-1 – GENERAL CONSTRUCTION

The General Contractor shall state the complete price to perform all work including, but not limited to, all general construction, demolition, and abatement as required at the Waverly School, as shown on the drawings and as specified herein.

BASE BID GC-1 BID PRICE = $_____

Lump Sum Allowance No.1 (See Section 012100) $_____

TOTAL GENERAL CONSTRUCTION BASE BID GC-1 BID PRICE = $_____
Total Bid price in dollars and cents

$_____
Bid price written in words

ALTERNATES FOR BASE BID GC-1

1. ALTERNATE No. GC-1

The General Contractor shall state the complete price to be **(added to)** the base bid to provide all labor and materials required to _____

_____as shown on the drawings, and as specified herein.

ADD: _____
Bid price written in words

$_____
Bid price in dollars and cents

BASE BID MC-1 – MECHANICAL CONSTRUCTION

The Mechanical Contractor shall state the complete price to perform all work including, but not limited to, all mechanical work required at the Waverly School, as shown on the drawings and as specified herein.

BASE BID MC-1 BID PRICE = $_____

Lump Sum Allowance No.1 $_____
(See Section 012100)

TOTAL MECHANICAL CONSTRUCTION
BASE BID MC-1 BID PRICE = $_____
Total Bid price in dollars and cents

$_____
Bid price written in words

ALTERNATES FOR BASE BID MC-1

1. ALTERNATE No. MC-1

The Mechanical Contractor shall state the complete price to be **(added to)** the base bid to provide all labor and materials required to _____
_____as shown on the drawings, and as specified herein.

ADD: _____
Bid price written in words

$_____
Bid price in dollars and cents

BASE BID PC-1 – PLUMBING CONSTRUCTION

The Plumbing Contractor shall state the complete price to perform all work including, but not

limited to, all plumbing work required at the Waverly School, as shown on the drawings and as specified herein.

BASE BID PC-1 BID PRICE = $_____

Lump Sum Allowance No.1 $_____
(See Section 012100)

TOTAL PLUMBING CONSTRUCTION
BASE BID PC-1 BID PRICE = $_____
Total Bid price in dollars and cents

$_____
Bid price written in words

ALTERNATES FOR BASE BID PC-1

1. ALTERNATE No. PC-1

The Plumbing Contractor shall state the complete price to be **(added to)** the base bid to provide all labor and materials required to _____ _____as shown on the drawings, and as specified herein.

ADD: _____
Bid price written in words

$_____
Bid price in dollars and cents

BASE BID EC-1 – ELECTRICAL CONSTRUCTION

The Electrical Contractor shall state the complete price to perform all work including, but not limited to, all electrical work required at the Waverly School, as shown on the drawings and as specified herein.

BASE BID EC-1 BID PRICE = $_____

Lump Sum Allowance No.1 $_____
(See Section 012100)

TOTAL ELECTRICAL CONSTRUCTION
BASE BID EC-1 BID PRICE = $_____
Total Bid price in dollars and cents

$_____
Bid price written in words

ALTERNATES FOR BASE BID EC-1

1. ALTERNATE No. EC-1

The Electrical Contractor shall state the complete price to be **(added to)** the base bid to provide all labor and materials required to _____ _____as shown on the drawings, and as specified herein.

ADD: _____
Bid price written in words

$_____
Bid price in dollars and cents

UNIT PRICES

Should the contract work be increased or decreased as per the General Conditions of the Contract, Article 7, Changes in the Work, the bidder hereby agrees that the following unit price is the basis for the extra or credit. The price includes all labor, material, overhead, profit, administration, insurance, taxes, and incidental or contributory items, or cost to the contractor and/or supplier in connection therewith. The price stipulated below shall be the amount of extra or credit applied to the contract for the increase or decrease in the scope of work.

Unit Prices for Base Bid GC-1 (General Construction)

The General Contractor shall state the complete amount to provide and install the following:

1. Unit Price: Contractor shall state the amount to _____ per _____ $_____ per
2. Unit Price: Contractor shall state the amount to _____ per _____ $_____ per

Unit Prices for Base Bid EC-1 (Electrical Construction)

The Electrical Contractor shall state the complete amount to provide and install the following:

1. Unit Price: Contractor shall state the amount to _____ per _____ $_____ per
2. Unit Price: Contractor shall state the amount to _____ per _____ $_____ per

The Board of Education hereby reserves the right to accept or reject any item set forth individually in Paragraph Nine above. The Owner may determine the lowest bid by adding one base bid to other base bid(s) and/or by adding to or deducting from those base bid(s), additive or deduct alternates, unit prices, or substitutions, if any, which the Owner elects to accept after the opening of bids.

Tenth: **BID SECURITY**

Each bidder shall deposit with his bid a bid bond, bank draft, or certified check in the amount of not less than ten percent (10%) of the Base Bid made payable to:

Board of Education, Eastchester Union Free School District in the amount:

_____ $(_____)

AND agrees such surety shall be a measure of liquidated damages should he default in delivery of agreement.

Eleventh: **COMPLETION** (Contractor shall fill in number of days)

It is intended that the work under this contract be completed substantially within _____ consecutive calendar days after receipt of authorized letter of intent issued by the District.

Twelfth: **NON-COLLUSIVE BIDDING CERTIFICATION**
General Municipal Law, Section 103-d
(Submit with Bid Proposal Form)

A. By submission of this bid, the bidder and each person signing on behalf of the bidder certifies, and if this is a joint bid each party hereto certifies as to its own organization, under penalty of perjury that to the best of the bidder's knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit a bid for the purpose of restricting competition.

B. A bid shall not be considered for award nor shall award be made where A-1, 2, and 3 above have not been complied with provided, however, that if in any case the bidder shall so state and shall furnish with a bid a signed statement which sets forth in detail the reasons therefore, where A-1, 2, and 3 above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department agency, or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that the bidder: (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute without more, a disclosure within the meaning of Paragraph A above.

C. If the bidder is a corporation, the corporation shall be deemed to have been authorized by the Board of Directors of the bidder to make the above certification and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

(Seal of Corporation) _____

Corporate or Company Name

By: _____

Signature Title

Date: _____

Thirteenth: On acceptance of this proposal for said work, the undersigned hereby binds himself or themselves to enter into written contract with the Board of Education within ten (10) days of date of notice of award, and to comply in all respects with the provisions set forth in "Instructions for Bidders" and "General Conditions of Contract" in relation to security for the faithful performance of the terms of said contract.

IF A CORPORATION (Seal of corporation):

NAME	ADDRESS
President	
Secretary	
Treasurer	

IF A FIRM:

NAME OF MEMBERS	ADDRESS

PROPOSED EQUIVALENT FORM

Project: _____

Name of Bidder (Corporate Name): _____

Date: _____ Prime Contract For: _____

In accordance with Instructions to Bidders, Article 8, the above listed Bidder proposes the following materials, equipment, or methods for consideration by the Architect as equivalents to those specified or shown in the Contract Documents, and for incorporation into the Work at no additional cost to the Owner. The Contractor is aware of the risk of acceptance.

Project Manual Section Number and Specified Product	Proposed Equivalent

PROPOSED SUBSTITUTION FORM

The Base Bid Contract Sum proposed by the undersigned on the preceding Bid Proposal Form is based upon all items exactly as shown and described in the Contract Documents. For the Owner's consideration, the Bidder proposes the following substitute materials, equipment, or methods to be used in the work, in lieu of those specified, with a credit for cost savings to the Owner if accepted. Refer to Article 8(c) of the Instructions to Bidders.

	Specified Product and Section Number	Proposed Substitute	Credit Amount
1.	_____	_____	
	_____	_____	$_____
2.	_____	_____	
	_____	_____	$_____
3.	_____	_____	
	_____	_____	$_____

Name of Bidder (Corporate Name):_____

Date: _____ By: _____
Signature of Corporate Officer

CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I, _____, being duly sworn, deposes and says that he/she is

the _____ of the _____ Corporation and that

neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

_____

SIGNED

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____
Describe the type of activities including but not limited to the amounts and the nature of the investments (*e.g*. banking, energy, real estate)_____
_____
_____
_____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity?_____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran?_____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):
_____
_____
_____
_____
_____
_____

I, _____ being duly sworn, deposes and says that he/she is the

_____ of the _____ Corporation and the foregoing

is true and accurate.

_____
SIGNED

SWORN to before me this

_____ day of _____

20____
Notary Public: _____

IRAN DIVESTMENT ACT COMPLIANCE RIDER

FOR SCHOOL DISTRICTS

The Iran Divestment Act of 2012, effective as of April 12, 2012, is codified at State Finance Law ("SFL") §165-a and General Municipal Law ("GML") §103-g. The Iran Divestment Act, with certain exceptions, prohibits municipalities, including the District, from entering into contracts with persons engaged in investment activities in the energy sector of Iran. Pursuant to the terms set forth in SFL §165-a and GML §103-g, a person engages in investment activities in the energy sector of Iran if:

(a) The person provides goods or services of twenty million dollars or more in the energy sector of Iran, including a person that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran; or

(b) The person is a financial institution that extends twenty million dollars or more in credit to another person, for forty-five days or more, if that person will use the credit to provide goods or services in the energy sector in Iran and is identified on a list created pursuant to paragraph (b) of subdivision three of Section 165-a of the SFL and maintained by the Commissioner of the Office of General Services.

A bid or proposal shall not be considered for award nor shall any award be made where the bidder or proposer fails to submit a signed and verified bidder's certification.

Each bidder or proposer must certify that it is not on the list of entities engaged in investment activities in Iran created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the SFL. In any case where the bidder or proposer cannot certify that it is not on such list, the bidder or proposer shall so state and shall furnish with the bid or proposal a signed statement which sets forth in detail the reasons why such statement cannot be made. The District may award a bid to a bidder who cannot make the certificate on a case by case basis if:

(1) The investment activities in Iran were made before the effective date of this section (i.e., April 12, 2012), the investment activities in Iran have not been expanded or renewed after the effective date of this section and the person has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or

(2) The District makes a determination that the goods or services are necessary for the District to perform its functions and that, absent an exemption, the District would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

STATEMENT OF BIDDER'S QUALIFICATIONS

1. Name of Bidder:

_____

2. Type of Business Entity:

_____

3. If the bidder is a corporation, state the date and place of incorporation of the corporation. If a partnership, state the date of organization and type of partnership. If individually owned, state the date of organization. If the form of your organization is other than those listed above, please describe.

_____

4. For how many years has the bidder done business under its present name, and how many years has your organization been in business as a contractor?

_____

5a. List the persons who are directors, officers, principals, owners, managerial employees or partners in the bidder's business.

_____

_____

5b. Under what other or former names has your organization operated?

_____

_____

6. Have any of the persons listed in Number 5 owned/operated/been shareholders in any other companies? If so, please state name of the person(s) who has owned/operated/been shareholders and name(s) of other companies:

7. Has your organization ever failed to complete any work awarded to it?

8. Has any director, officer, owner or managerial employee had any professional license suspended or revoked? If the answer to this question is yes, list the name of the individual, the professional license he/she formerly held, whether said license was revoked or suspended and the date of the revocation or suspension.

9. During the three year period preceding the submission of this bid, has the bidder been found guilty of any OSHA Violations? If the answer to this question is yes, describe the nature of the OSHA violation, an explanation of remediation or other steps taken regarding such violation(s).

10. During the five year period preceding the submission of this bid, has the bidder been charged with any claims pertaining to unlawful intimidation or discrimination against any employee by reason of race, creed, color, disability, sex or natural origin and/or violations of an employee's civil rights or equal employment opportunities? If the answer to this question is yes, list the persons making such claim against the bidder, a description of the claim, the status of the claim, and what disposition (if any) ahs been made regarding such claim.

11. During the five year period preceding the submission of this bid, has the bidder been named as a party in any lawsuit in an action involving a claim for personal injury or wrongful death arising from performance or work related to any project in which it has been engaged? If the answer to this question is yes, list all such lawsuits, the index number associated with said suit and the status of the lawsuit at the time of the submission of this bid.

12. During the five year period preceding the submission of this bid, has the bidder been the subject of an investigation and/or proceedings before the Department of Labor for alleged violations of the Labor Law as it relates to the payment of prevailing wages and/or supplemental payment requirements? If the answer to this question is yes, please list each such instance of the commencement of a Department of labor proceeding, for which project such proceeding was commenced, and the status of the proceeding at the time of the submission of this bid.

13. During the five year period preceding the bidder's submission of this bid, has the bidder been the subject of an investigation and/or proceeding before any law enforcement agency, including, but not limited to any District Attorney's Office? If the answer to this question is yes, please list each such instance, the law enforcement agency, the nature of the proceeding, the project for which such proceeding was commenced, if applicable to a project, and the status of the proceeding at the time of the submission of this bid.

14. During the five year period preceding the bidder's submission of this bid, has the bidder been the subject of proceedings involving allegations that it violated the Workers' Compensation Law including, but not limited to the failure to provide proof of worker's compensation or disability coverage and/or any lapses thereof. If the answer to this question is yes, list each such instance of violation and the status of the claimed violation at the time of the submissions of this bid.

15. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment during the five years preceding the submission of this bid? If the answer to this question is yes, list the name of the individual convicted or indicated, the charge against the individual and the date of disposition of the charge.

16. During the five year period preceding the bidder's submission of this bid, has the bidder been charged with and/or found guilty of any violations of federal, state, or municipal environmental and/or health laws, codes, rules and/or regulations? If the answer to this question is yes, list the nature of the charge against the bidder, the date of the charge, and the status of the charge at the time of the submission of this bid.

17. Does the bidder have any major construction projects ongoing at the time of the submission of this bid? If the answer to this question is yes, list the projects on which the bidder is currently working, the percentage complete, and the owner, architect, contract amount and the expected date of completion of said project. State total worth of work in progress and under contract.

18. Has the bidder ever been terminated from a Project by the Owner? If the answer to this question is yes, list the projects on which the bidder was terminated, the nature of the termination (convenience, suspension, for cause), and the date of said termination.

19. Are there any other judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

_____

_____

_____

_____

Dated: By: _____
(Signature)

_____
(Print Name and Title)

Sworn to before me this

_____ day of _____, 201__.

_____
Notary Public

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AIA® Document A305® – 2020

Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

« »

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

« »

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

« »

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

« »

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

« »

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

« »

.2 If your organization is a partnership, identify its partners and its date of organization.

« »

.3 If your organization is individually owned, identify its owner and date of organization.

« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

« »

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

« »

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

« »

§ A.1.3.2 How many full-time employees work for your organization?

« »

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

« »

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

« »

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

« »

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

« »

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

« »

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

« »

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

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« »

§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

« »

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

« »

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

« »

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

« »

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

« »

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

« »

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

« »

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AIA® Document A305® – 2020
Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

« »

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

« »

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

« »

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

« »

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

« »

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

« »

.2 been terminated for any reason?

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« »

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

« »

.4 filed any lawsuits or requested arbitration regarding a construction project?

« »

.5 not been awarded a contract for which you submitted the lowest bid? If you have answered yes, provide project name, contract description, contact information for project Owner, Architect and/or Construction Manager and reason for not being awarded the contract.

« »

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

« »

.2 had any business or professional license subjected to disciplinary action?

« »

.3 been penalized or fined by a state or federal environmental agency?

« »

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Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

« »
« »

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

« »

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

« »

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

« »

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

« »

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

« »

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

« »

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

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« »

§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

« »

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

« »

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

« »

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

« »

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

« »

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

« »

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

« »

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

« »

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

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§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

« »

§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

« »

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

« »

§ C.5.2 Surety company name:

« »

§ C.5.3 Surety agent name and contact information:

« »

§ C.5.4 Total bonding capacity:

« »

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

« »

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Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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AIA® Document A305® – 2020

Exhibit E

Contractor's Past Project Experience, Continued

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)
« »

SUBMITTED TO:
(Organization name and address.)
« »

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)
« »

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[« X »] Exhibit A – General Information
[« X »] Exhibit B – Financial and Performance Information
[« X »] Exhibit C – Project-Specific Information
[« X »] Exhibit D – Past Project Experience
[« X »] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

_____ « »
Organization's Authorized Representative Signature **Date**

« »
_____
Printed Name and Title

NOTARY
State of: « »
County of: « »
Signed and sworn to before me this « » day of « » « »

_____
Notary Signature

My commission expires: « »

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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CERTIFICATION REGARDING WORKPLACE SEXUAL HARASSMENT/TRAINING

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of section two hundred one-g of the labor law.

If this is submitted by a corporate entity, the certification shall be deemed to have been authorized by the board of directors (or comparable entity) of the bidder, and such authorization shall be deemed to include the signing and submission of this bid and the inclusion therein of this certification as the act and deed of the corporate entity.

Name of Bidder: _____ (Print)

_____ (Signature)

_____ (Print Name)

_____ (Print Title)

Date: _____

Labor Law Section 220-i Certification

This Certification is provided pursuant to Section 220-i of the New York Labor Law, which requires contractors and subcontractors submitting bids or performing work on a covered project to be registered with the New York State Department of Labor (NYSDOL). This Certification must be completed and submitted as part of your bid proposal.

- NYSDOL Registration Number: _____
- Registration Expiration Date: _____

By signing below, the person authorized to sign on behalf of the Bidder hereby certifies, under penalty of perjury, that the Bidder and each of its subcontractors are registered with the New York State Department of Labor pursuant to Section 220-i of the New York Labor Law.

Bidder further represent that it included with this Certification, a copy of the Certificate(s) of Registration issued by the Commissioner of the Department of Labor for the Bidder and each of its subcontractor(s).

I further certify that I will provide immediate written notice to the Owner if the contractor or any subcontractor's registration becomes suspended, revoked, or expired at any point prior to or during the course of the project.

Project: _____

Signature: _____

Bidder Name: _____

Bidder Title: _____

Company Name: _____

Date: _____

AIA® Document A132™ – 2019

Standard Form of Agreement Between Owner and Contractor, *Construction Manager as Adviser Edition*

AGREEMENT made as of the day of in the year
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

and the Contractor:
(Name, legal status, address, and other information)

for the following Project:
(Name, location, and detailed description)

The Construction Manager:
(Name, legal status, address, and other information)

The Architect:
(Name, legal status, address, and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:
(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

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§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of all of the Contractors for the Project are to be completed prior to Substantial Completion of the entire Work of all of the Contractors for the Project, the Contractors shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:

(Check the appropriate box.)

[ ] Stipulated Sum, in accordance with Section 4.2 below

[ ] Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below

[ ] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

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Item	Price	Conditions for Acceptance

§ 4.2.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.2.4 Unit prices, if any:
(Identify the item and state the unit price, and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price
§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

§ 4.3.3 The method of adjustment of the Contractor's Fee for changes in the Work:

§ 4.3.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

§ 4.3.5 Rental rates for Contractor-owned equipment shall not exceed percent (%) of the standard rental rate paid at the place of the Project.

§ 4.3.6 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3.7 The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price
§ 4.4.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

§ 4.4.3 The method of adjustment of the Contractor's Fee for changes in the Work:

§ 4.4.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

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§ 4.4.5 Rental rates for Contractor-owned equipment shall not exceed percent (%) of the standard rental rate paid at the place of the Project.

§ 4.4.6 Unit Prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.4.7 Guaranteed Maximum Price
§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed ($), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

§ 4.4.7.2 Alternates
§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:

Item	Price

§ 4.4.7.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

Item	Price

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:
(Identify each assumption.)

§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

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§ 4.6 Other:
(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Construction Manager receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

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§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a Guaranteed Maximum Price

§ 5.1.5.1 With each Application for Payment, the Contractor shall submit the cost control information required in Exhibit B, Determination of the Cost of the Work, along with payrolls, petty cash accounts, receipted invoices, or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor, plus payrolls for the period covered by the present Application for Payment, less that portion of the payments attributable to the Contractor's Fee.

§ 5.1.5.2 Applications for Payment shall show the Cost of the Work actually incurred by the Contractor through the end of the period covered by the Application for Payment and for which the Contractor has made or intends to make actual payment prior to the next Application for Payment.

§ 5.1.5.3 In accordance with AIA Document A232-2019 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.5.3.1 The amount of each progress payment shall first include:

.1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;

.2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and

.3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work included in Section 5.1.5.3.1.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 5.1.5.3.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;

.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.5.5 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor, and such action shall not be deemed to be a representation that (1) the Construction Manager and Architect have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Article 5 or other supporting data; (2) that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.5.6 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.1.5.7 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

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§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a Guaranteed Maximum Price

§ 5.1.6.1 With each Application for Payment, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 5.1.6.2 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

§ 5.1.6.2.1 The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.6.2.2 The allocation of the Guaranteed Maximum Price under this Section 5.1.6.2 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

§ 5.1.6.2.3 When the Contractor allocates costs from a contingency to another line item in the schedule of values, the Contractor shall submit supporting documentation to the Architect and Construction Manager.

§ 5.1.6.3 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed; or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Contractor on account of that portion of the Work and for which the Contractor has made payment or intends to make payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

§ 5.1.6.4 In accordance with AIA Document A232-2019, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.4.1 The amount of each progress payment shall first include:

- **.1** That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;
- **.2** That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- **.4** The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 5.1.6.4.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

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.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;

.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.6.5 The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.6.6 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.6.7 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.1.6.8 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:
(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)

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§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

§ 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 5.2.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

§ 5.2.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Article 15 of AIA Document A232–2019.

[ ] Litigation in a court of competent jurisdiction.

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[ ] Other: *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

.1 Take the Cost of the Work incurred by the Contractor to the date of termination;

.2 Add the Contractor's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232-2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

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§ 7.2.1.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term "profit" shall be understood to mean the Contractor's Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

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§ 8.7 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

§ 8.8 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

.2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit

.3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document A132™–2019, Exhibit B, Determination of the Cost of the Work

[ ] AIA Document E235™–2019, Sustainable Projects Exhibit, Construction Manager as Adviser Edition, dated as indicated below:

(Insert the date of the E235-2019 incorporated into this Agreement.)

[ ] The Sustainability Plan:

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Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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AIA® Document A232™ – 2019

General Conditions of the Contract for Construction, *Construction Manager as Adviser Edition*

for the following PROJECT:
(Name, and location or address)

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

THE OWNER:
(Name, legal status, and address)

THE ARCHITECT:
(Name, legal status, and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

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§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building

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Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work, and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

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assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect, and the Construction Manager or Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction

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where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or

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(2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents:

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

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§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract

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Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Construction Manager and Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

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§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager, Architect, and Contractor. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Contractors shall be

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through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity. If the Owner assigns the subcontract to a successor Contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor Contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces, Separate Contractors, or other Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

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§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Construction Manager and Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section

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15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Construction Manager, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all

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Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality

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or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor or other Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Construction Manager will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor

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fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction

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Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data

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establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents;
.3 terms of special warranties required by the Contract Documents; or
.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
.4 construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

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§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of

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tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the

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Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to

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requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

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§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become

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requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

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.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

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§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages. The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation

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within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

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§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT

(CROSS-REFERENCE AIA DOCUMENT A232/2019)

1. List of Drawings

   The Drawings, which are the graphic and pictorial portions of the Contract Documents that show the design, location and dimension of the Work are as listed within the "List of Drawings" provided with the drawing set. All Work under this Contract shall be executed in accordance with the Contract Documents, which are typically composed of the Project Manual, Specifications and Drawings. The Contract Documents are complimentary as described in the General Conditions. The "List of Drawings" will be incorporated in the Standard Form of Agreement Between the Owner and the Contractor.

2. Provision of Documents

   A. Each Prime Contractor is entitled to five printed sets of Drawings, three Project Manuals, and three sets of all Addenda materials. The three sets are inclusive of the original set obtained for bidding purposes. These sets will be provided at the Owners expense exclusive of the original Bid Deposit, which is forfeited by the awarded contractors.

   B. Additional sets of Contract Documents will be provided to the contractors for the cost of reproduction and distribution charges. Payment is due upon receipt of the Documents.

   C. Reproducible copies of the Drawings shall be provided upon the request of the Prime Contractor and are to be provided for the cost of reproduction and distribution charges. Payment is due upon receipt of the Documents.

   D. For expediency, at the discretion of the Architect, Prime Contractors may be directed to pick up documents at the project designated printing facility. This practice will not be permitted without authorization of/and coordination by the Architect.

   E. Electronic drawing files, AutoCAD format, may be available, at the discretion of the Architect, for a cost of $25.00 per drawing. Contractors requesting this service will be required to sign a disclaimer. Request for electronic files must be made in writing to the Architects office. This request must include a specific list of drawings required in this format. In response, the architect will verify the drawings requested and will forward the disclaimer for signature. Electronic files will be released upon receipt of payment and a fully executed disclaimer form.

3. Minimum Rates of Wages

   A. In accordance with Section 220, Subdivision 3 and 220-d of the Labor Law, the Industrial Commissioner, Department of Labor, State of New York, has ascertained the prevailing rates of wages which will apply to this Project.

   B. The Prevailing Rates of Wages, which are the minimum hourly rates to be paid on this project, shall be indicated in the PW-3, PW-19, PW-202, PW-203, and PW-16 sheets enclosed.

   C. Any person or corporation that willfully pays, after entering such contract, less than established wage schedule shall be guilty of a misdemeanor and, upon conviction, shall be punished for such first offense by a fine of $500 or by imprisonment for not more than 30 days or both fined and imprisoned. A second offense carries a heavier penalty.

4. A.I.A. Documents

A. The "General Conditions of the Contract for Construction" Standard A.I.A. Form A232, 2019 edition, will become, under the Agreement, one of the Documents of the Contract and shall govern all Work under this Contract.

B. The following supplements modify the "General Conditions of the Contract for Construction," A.I.A. Document A232, 2019 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

C. **Article 1 - General Provisions**

1.1 Basic Definitions

Add the following Subparagraph to 1.1.2:

1.1.2.1 Where the term "Contract" or "Prime Contract" is used in the General Conditions, Supplementary Conditions, and other Contract Documents, it shall mean the separate Owner-Contractor Agreement between the Owner and each Prime Contractor identified in Division 01.

1.2 Correlation and Intent of the Contract Documents

Add new subparagraph 1.2.4:

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities.

1. Modifications issued after execution of the Agreement.

2. The Agreement Between the Owner and the Contractor.

3. Addenda, issued prior to the execution of the Agreement, with those of later dates having precedence over those of earlier dates.

4. The Supplementary Conditions, Rider to the General Conditions, Special Provisions or Requirements (if any).

5. The General Conditions of the Contract for Construction.

6. Drawings and Specifications.

After execution of the Agreement and during the course of the Work should any ambiguities, discrepancies, omissions, or apparent errors be found on the drawings or in the specifications to which the Contractor has failed to call attention prior to submitting his bid, then the intention of the Contract Documents is to be interpreted by the Architect.

The Architect's decision as to the intent shall be final, and the Contractor hereby agrees to carry out the Work in accordance with the decision of the Architect.

Until such time as an interpretation is issued, it shall be assumed that the Contractor has based his bid on providing the Work in the better quality, greater quantity, or most expensive manner, for Work complete in every detail, even though every item necessarily involved is not particularly mentioned.

If necessary, measurements are missing or Work specified or shown in the Contract Documents is obviously incorrect or impossible to execute, or figures fail to check, the Contractor shall call these facts to the attention of the Architect for interpretation as described above.

Add new subparagraph:

1.2.5 Figured Dimensions--Drawings in general are made to scale, but all Working dimensions shall be taken from the figured dimensions or by actual measurements at the job and in no case by scaling. The Contractor shall study and compare all drawings and verify all figures before laying out the Work for construction and shall be responsible for any and all errors in his Work which might have been avoided by not doing so. Whether or not an error is believed to exist, no deviation from the drawings and dimensions given thereon shall be made unless written approval of the Architect is obtained.

D. **Article 2 - Owner**

2.4 Owner's Right to Stop the Work

Delete Paragraph 2.4 in its entirety and replace with the following:

2.4 "If the Contractor fails to correct Work which is not in accordance with the requirements of Contract Documents as required by Section 12.2 or fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the Work within the Contract Time or fails to remove and discharge (within ten days) any lien filed upon Owner's property by anyone claiming by, through, or under Contractor, or disregards, the instruction of the Architect, Construction Manager or Owner when based on the requirements of the Contract Documents, the Owner, by written order signed personally or by an agent so empowered by the Owner, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated (as determined by the Owner or its agency); however, the right of Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right either on its behalf or for the benefit of the Contractor or any other person or entity. The Contractor shall stop work upon receipt of said order the written order described herein above may be delivered to and shall be deemed received by the Contractor in the same manner as set forth in paragraph 1.6.2."

2.5 Owner's Right to Carry Out the Work

Add the following after the end of 2.5:

If the Owner, Architect or Construction Manager (if applicable) request that any of the Prime Contractors perform additional work which is not included in the Construction Documents and which will result in either additional cost or additional time a fully executed Change Order is required.

The Contractor shall submit a proposal for the additional work. This proposal shall contain a complete itemization of the costs associated with the work inclusive of all labor and materials. All proposals for any work that the Contractor, its Subcontractors or Subcontractors of subcontractors perform in connection with the additional work shall be submitted utilizing the format contained herein below (item 7.2.3). In no event shall the total for overhead and profit on any Change Order exceed fifteen percent (15%) of the cost of the work.

1. Any proposals submitted without an itemized breakdown as indicated herein will be returned for resubmission.

2. For work performed by the Prime Contractor, fifteen percent (15%) overhead and profit is permitted for their labor and material costs.

3. Overhead can only be applied to the cost of labor and materials, including delivery.

4. Overhead and profit is not permitted on rental of equipment and machinery.

5. Equipment and machinery costs shall not include items already on site and under use for the base contract.

6. Additional bond costs shall be 2 % maximum.

7. Insurance costs fall within overhead costs.

8. Subcontractor proposals in connection with the work shall include a maximum of ten percent (10%) overhead and profit for their work.

9. The Prime Contractor is permitted five percent (5%) profit on the work of its Subcontractor as indicated in the Table at 7.2.3.

10. Under no circumstance shall the Contractor or its Subcontractors be entitled to overtime costs unless otherwise agreed and approved by the Owner. (Ref Article 8 – Time)

11. A change in the Contract sum shall only be accomplished by a written Change Order. Payments cannot be issued against a Change Order unless it has been fully executed.

12. Adjustments in time if required will be in accordance with Article 8.

Proposals for additional work shall be submitted in the following format accompanied by sufficient substantiating data to permit a proper evaluation.

	Proposed Change Order	Estimated cost
A	Prime Contractors Materials (itemized quantities & cost)	
B	Prime Contractors Labor (itemized)	
C	Subtotal (A+B)	
D	Any credit due shall be applied here	
E	Overhead 10% of Subtotal	
F	Subtotal (C+D+-E)	
G	Subcontracted work (include itemized quantities and costs and 10% max OH&P)	
H	Subtotal (F+G)	
I	Prime Contractors Profit 5%	
J	Subtotal (H+I)	
K	Equipment and Machinery Rental (itemized)	
L	Bond Costs (2% max)	
M	Total Proposed Change Order (J+K+L)	

E. **Article 3 - Contractor**

3.1 General:

Add the following Paragraph to 3.1:

3.1.4 Where the term "Prime Contractor" is used in the General Conditions, Supplementary Conditions, and other Contract Documents, it shall be interpreted in accordance with Subparagraph 6.1.2.1. of the Supplementary Conditions."

3.2 Review of Contract Documents and Field Conditions by Contractor

Delete Paragraph 3.2.2 in its entirety and replace with the following:

3.2.2 The Contractor is deemed to be a qualified expert in the systems and construction requirements of the Work of its Contract. The Contractor hereby specifically acknowledges and declares that the Contract Documents are full and complete, are sufficient to have enabled it to determine the cost of the Work and that the Drawings, the Specifications and all addenda are sufficient to enable the Contractor to construct the Work outlined therein in accordance with applicable laws, statues, building codes and regulations, and otherwise to fulfill all of its obligations under the Contract Documents. In addition, if the Contractor performs any construction activity and if it knows or should have know that any of the Contract Documents contains an error, inconsistency or omission, the Contractor shall be responsible for such performance and shall bear the costs for correction thereof.

3.3 Supervision and Construction Procedures:

Add the following Subparagraph to 3.3.1:

3.3.1.1 The Contractor shall:

1. review any specified construction or installation procedure, including those recommended by manufacturers,

2. advise the Architect:

   a. if the specified procedure deviates from good construction practice, or
   b. of any objections the Contractor may have to the procedure; and

3. propose any alternative procedure.

3.3.2 Insert the following language (noted in *italic)* in Paragraph 3.3.2: *"…and other persons or entities performing portions of the Work under a Contract or other arrangement with the Contractor."*

3.4 Labor and Materials:

Add the following Paragraphs to 3.4:

3.4.4 The Contractor shall check all materials and labor entering into the Work site and shall keep full detailed accounts thereof.

3.4.5 The Contractor acknowledges that it is the Contractor's responsibility to hire

all personnel for the proper and diligent execution of the Work and the Contractor shall maintain labor peace for the duration of the Project. In the event of a labor dispute, the Contractor shall not be entitled to any increase in the Contract schedule of the Contract Sum.

3.4.6 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 01 of the Specifications).

3.4.7 By making requests for substitution based on Subparagraph 3.4.2 above, the Contractor:

1. represents that the Contractor has personally investigated the proposed substitute product;

2. represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

3. certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitutions which subsequently becomes apparent;

4. will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects; and

5. will reimburse the Owner for additional costs from claims by other Prime Contractors resulting from incorporation of requested substitution.

3.4.8 The burden of proof of equivalence rests with the bidder. Adequate supporting information must accompany proposed equivalents. The Owner or Architect reserves the right to accept or reject proposed equivalents.

3.5 Warranty:

Add the following at the end of Subparagraph 3.5.1:

The Contractor will be responsible for and shall make good any defects due to faulty materials for two (2) years and two (2) years on labor after final payment has been made, except where sections of the Specifications call for a longer period of time.

Add The following to 3.5:

3.5.3 The burden of proof of equivalence rests with the bidder. Adequate supporting information must accompany proposed equivalents. The Owner or Architect reserves the right to accept or reject proposed equivalents.

3.6 Superintendent:

Delete paragraph 3.9.2 in its entirety and replace with the following:

3.9.2 Qualifications of Superintendent: The Contractor shall employ a Superintendent, for the duration of the Project, whose qualifications meet or exceed those listed below. Prior to employing the Superintendent, the

Contractor shall submit to the Architect the name of the proposed Superintendent and a statement attesting to his qualifications.

1. Five (5) years of experience as a Superintendent in the particular construction discipline required by the Contract.

2. Superintendent on at least two (2) construction projects equal to, or greater than, the Contract Sum for this Contract.

3. Superintendent on at least two (2) projects of similar construction types and procedures as this Project.

3.7 Shop Drawings, Product Data, and Samples:

Add the following to the end of paragraph 3.12.1:

"The shop drawings shall include fabrication, erection, layout, and setting drawings and schedules, wiring and piping diagrams; and any other information required for proper approval of or installation of all parts of the Work specified. If any modifications are required to a standard item, such modifications shall be clearly shown or noted at the time of submission of shop drawings."

Delete paragraph 3.12.2 in its entirety and substitute the following:

"Product Data are illustrations, standard schedules, performance charts, recommended installation procedures and instructions, operating and maintenance procedures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work."

Add the following to the end of paragraph 3.12.5:

"All submissions shall be in accordance with Section 013300 - Submittal Procedures."

Add the following to the end of paragraph 3.12.6:

"Contractor shall be responsible for verification of field dimensions and conditions and shall furnish such information to the Architect when requested. Before Contractor proceeds with the Work in question, the Contractor should field verify all dimensions. In case of doubt about dimensions, he should notify the Architect immediately for instructions."

Add the following new Paragraphs to 3.12:

3.12.11 Samples shall be properly labeled, giving the following information as applicable:

1. Project name and location.

2. Name, finish, and composition of material.

3. Location where material is to be used.

4. When approved, samples shall be so indicated.

5. Labels shall be large enough for approval stamp.

3.12.12 Immediately after signing of the Contract by the Owner and Contractor, the

Contractor must submit to the Owner and Architect a complete list of shop drawings from all trades and specify the approximate dates on which they will be submitted for approval.

F. **Article 4 - Architect**

4.2 Administration of the Contract:

Modify 4.2.5 as follows:

Omit "…or any other persons or entities performing portions of the work," and substitute "… or any other persons or entities in a contractual relationship with the Contractor performing portions of the Work."

Add the following Subparagraphs to 4.2.6:

4.2.6.1 Any direct communications between the Owner and the Contractor that affect the performance or administration of the Contract shall be made or confirmed in writing, with copies to the Architect, and any such communications that represent a modification of the Contract requirements shall be documented appropriately.

4.2.6.2 Any communications between the Architect and the Contractor's subcontractors shall be confirmed in writing to the Contractor.

G. **Article 5 - Subcontractors**

5.2 Award of Subcontracts and Other Contracts for Portions of the Work:

Add the following Subparagraphs to 5.2.1:

5.2.1.1 Refer to Instructions to Bidders, for requirements for delivery of "Contractor's Subcontractor List" to Architect's office after receipt of bids and before award of the Contract."

5.2.1.2 Subcontractors will not be acceptable unless, when requested by the Architect, evidence is furnished that the proposed subcontractor has satisfactorily completed similar subcontracts as contemplated under this Prime Contract and has the necessary experience, personnel, equipment, plant, and financial ability to complete the subcontract in accordance with the intent of the Contract Documents.

Delete Subparagraphs 5.2.2 and 5.2.3 in their entirety and substitute the following:

5.2.2 The Contractor shall within thirty (30) days after the Award of Contract, submit for approval a complete list of all subcontractors, and any one subcontractor listed who is not acceptable to the Architect or Owner shall be replaced with an acceptable subcontractor at no change in the contract price.

5.2.3 Approval of a subcontractor may be revoked or withdrawn, if, in the opinion of the Architect, such subcontractor evidences an unwillingness or inability to perform his Work in strict accordance with the Contract Documents.

Add the following Paragraph to 5.2:

5.2.5 All subcontracts over $5,000 shall be in writing with copies of written

subcontract provided to the Owner upon request.

H. **Article 6 - Construction by Owner or By Separate Contractors**

6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts:

Add the following Subparagraphs to 6.1.2:

6.1.2.1 Where the term "Contractor" or "Prime Contractor" is issued in the General Conditions, Supplementary Conditions, and other Contract Documents, it shall mean the Contractor identified in Division 01 who executed each separate Owner-Contractor Agreement.

6.1.2.2 Where the term "separate contractor" is used in this Article, it shall mean other contractors performing construction or operation on the site not included in the Project.

6.1.2.3 The Contractor shall provide for coordination of his activities with the activities of each Prime Contractor. This includes, but is not limited to, the Owner's own forces or separate Contractor's employed directly by the Owner.

6.2 Mutual Responsibility:

Add the following Subparagraphs to 6.2.2:

6.2.2.1 Each Prime Contractor shall promptly correct discrepancies or defects in their Work identified by other Prime Contractors as affecting proper execution and results of the Work of the other Prime Contractor.

Add the following Subparagraph to 6.2.2:

6.2.2.2 Claims and other disputes and matters in questions between the Contractor and other Prime Contractors shall be subject to the provisions of Article 15.

Add the following new Subparagraph to 6.2.5:

6.2.5.1 All required cutting, patching, and restoring shall be neatly done by mechanics skilled in their specific trades, to the satisfaction of the Architect.

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Add the following new Subparagraphs:

6.2.76 The Contractor shall leave all Work of his trade WHOLE, PERFECT, AND COMPLETE at the final completion of the Work.

I. **Article 8 - Time**

8.2 Progress and Completion:

Add the following Subparagraph to 8.2.1

8.2.1.1 The Contractor recognizes that the Project Schedule is of critical importance to the Owner. All aspects of construction must reflect a 'time is of the essence' construction strategy. The 'Bid Schedules' serve as a guide of critical milestone dates to the Project. Failure to meet intermediate milestone dates will jeopardize the overall Project Schedule. If the Contractor's performance of

the Work evidences, to the Owner or Architect, that the completion day may be in jeopardy, this will mandate Contractor(s) to increase staff, work overtime, or use other means to recover time, at the costs of those Contractor(s) responsible for such delays. In addition, all costs due to delays in completion of the Work shall be borne by Contractor(s) responsible for delays.

Add the following Subparagraph to 8.2.2:

8.2.2.1 The Contractor shall not commence Work on the site until two certified copies of all insurance policies as indicated in Article 11, attesting that the required coverage is in force, have been received and accepted by the Owner.

Add the following Subparagraph to 8.2.3:

8.2.3.1 The Contractor shall cooperate with the Owner, Architect, Engineer, and other Contractors on the Project, making every reasonable effort to reduce the Contract Time.

8.3 Delays and Extensions of Time:

Delete Paragraph 8.3.1 and replace with the following:

8.3.1 "If the Contractor is delayed at/in its progress of the Work by one of the delays for which an extension of time is permitted and gives the Owners Representative written notice specifically describing the delay within 48 hours of its commencement, the date for the Substantial Completion of the Work will be extended by Change Order for such reasonable time as the Owner's Representative may determine. The failure to give such notice will constitute an irrevocable waiver of the Contractor's right to seek an extension for such delay. The only delays for which the Contractor will be entitled to an extension of the time for completion will be delays caused by the Architect, Construction Manager, or the Owner, physical damage to the Project over which the Contractor has no control, labor disputes beyond the control of the Contractor, and unusually severe weather conditions not reasonably anticipated (temperature, rain, or other precipitation within a range of twenty percent of normal amounts for the time of the year covered by the Agreement shall not be considered unusually severe weather conditions) or by fire, unavoidable casualties or by other causes beyond the Contractors reasonable control. Extensions of time will only be granted pursuant to the procedures for Change Orders set forth in the General Conditions. The Contractor agrees not to make claims for financial compensation for delays or acceleration in the performance of the Work resulting from acts or failure to act by the Owner, the Architect, Construction Manager, or the employees, agents, or representatives of the Owner, Construction Manager, or the Architect and agrees that such claim shall be fully compensated by an extension of time to complete the Work, regardless of when granted. Contractor delayed by Work of other Contractors shall make claims against delaying Contractor and not the Owner."

Add the following Subparagraphs to 8.3.1:

8.3.1.1 Extension of time, if requested by the Contractor, shall only be considered after the Contractor has made reasonable effort to recover the lost time.

8.3.1.2 An extension, or extensions, of time may be granted subject to the provisions of this article, but only after written application therefore by the Contractor in accordance with Paragraph 15.1.5.

8.3.1.3 An extension of time shall be only for the number of days of delay which the Architect may determine to be due solely to the causes set forth in the application for extension of time. The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently; but if at all, only the actual period of delay as determined by the Architect.

8.3.1.4 When the Contract Time has been extended, as provided under this Paragraph 8.3, such extension of time shall not be considered as justifying extra compensation to the Contractor for administrative costs or other similar reasons.

Delete paragraph 8.3.2 and replace as follows:

8.3.2 Claims relating to time shall be made in accordance with applicable provisions of this Agreement. A copy of any Claim for extension of time shall be delivered to the Owner, the Architect and the Construction Manager, and the Contractor shall immediately take all steps reasonably possible to lessen the adverse impact of such delay to the Owner.

Delete paragraph 8.3.3 and replace as follows:

8.3.3 In no event shall the Contractor be entitled to monetary damages for delay under the Contract.

A new paragraph 8.3.4 shall be added as follows:

8.3.4 To the extent the Contractor is required to work during overtime hours, weekend, holidays or at other times which are not regularly scheduled, due to the fault of the Contractor, the Contractor shall be responsible for the costs incurred by the Owner, Architect, the Construction Manager and the others attributable to working during periods which have not been ordinarily scheduled. To the extent the Contractor elects to work during these periods to facilitate the schedule, the Owner may, at its sole option, allow the Contractor to do so without the Contractor incurring the additional costs referenced above.

J. **Article 9 - Payments and Completion**

9.2 Schedule of Values:

9.2 In the first sentence, after Construction Manager, add “and the Architect”. In the last sentence, after Construction Manager, add “and the Architect”.

9.3 Application for Payment:

9.3.1 In the second sentence, delete the words "if required."

Add the following Subparagraphs to 9.3.1:

9.3.1.3 Until final completion and acceptance of Work in accordance with Paragraph 9.10, the Owner shall pay 95 percent of the amount of each progress payment due the Contractor.

9.3.1.3.1 The application for payment shall be accompanied by the following documentation:

a. A current contractor's lien waiver.

b. Duly executed waivers of Public Improvement liens from all subcontractors and material suppliers representing satisfaction of payment of all amounts requested by the Contractor on behalf of such entities in any previous application for payment.

c. Certified Payroll for all employees of the Contractor and employees of subcontractors performing Work on the Project.

d. For contracts of $250,000 and more, all Contractors and subcontractors must attach a copy of proof of completion of the OSHA 10 course to the first Certified Payroll submitted and on each succeeding payroll where any new or additional employee is first listed.

e. Such other information which the Owner and/or the Architect request the Contractor furnish in connection with its Application for Payment.

Add the following Subparagraphs to 9.3.2:

9.3.2.1 Additionally, the Contractor must furnish the following information, where payment is requested for materials and equipment stored off the project site, as part of its Application for Payment:

1. Type of material must be specifically identified by the trade contractor.

2. Trade contractor must furnish an invoice from his supplier showing the total value of the material and/or equipment being stored off site.

3. Trade contractor must provide a Certificate of Insurance for the full value of the item plus 10 percent.

Add the following subparagraph to 9.3.3:

9.3.3.1 The Contractor shall keep the Owner and the Owner's property (including funds or payment under the Project) free from all liens and claims, legal or equitable arising out Contractor's work hereunder. If any such lien is filed with the Owner by anyone claiming by through or under the Contractor, the Contractor shall discharge the lien within 10 days of the filing thereof. The Contractor further expressly agrees to defend the Owner, at the Contractor's sole expense, against any actions, lawsuits or proceedings brought against Owner as a result of liens filed against payments due the Contractor or the Work, the site of any of the Work, the Project site and any improvements thereon, any portion of the property of the Owner. The Contractor hereby agrees to indemnify and hold Owner's harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits or proceedings. The Owner agrees to release any payments withheld as a result of a duly field lien upon compliance by the Contractor with the applicable discharge or vacatur provisions of the Lien Law.

9.6 Progress Payments:

Add the following new paragraphs:

9.6.9 Unless otherwise specified in the agreement, the Owner will make payment in

account of the Contract as provided therein as follows:

Any claims, liens, and judgements referred to in this section shall pertain to the project and shall be filed in accordance with the terms or the applicable contract and/or applicable laws. In the event that the terms of payment on a public Works project, as provided in this section, are pre-empted or superseded as a result of the provision of any federal statute, regulation, or rule, paragraph shall not apply.

9.6.10 In accordance with Part I, Section 106-b, General Municipal Law, the Contractor shall periodically, in accordance with the terms of the Contract, submit to the Architect a requisition for a progress payment for the Work performed and/or materials furnished to the date of the requisition less any amount previously paid to the Contractor. The Owner shall, in accordance with the terms of the Contract, approve and promptly pay the requisition for the progress payment less an amount necessary to satisfy any claims, liens, or judgements against the Contractor which have not been suitably discharged and less any retained amount as hereafter described. The Owner shall not retain in excess of five percent (5%) but not more than ten percent (10%) of each progress payment to the Contractor provided that there are no requirements by the Owner for the Contractor to provide a Performance Bond and Labor and Material Bond in the full amount of the Contract. The Owner shall pay, upon requisition from the Contractor, for materials pertinent to the Project which have been delivered to the site or off-site by the Contractor and/or subcontractor and suitably stored and secured as required by the Owner and the Contractor, provided the Owner may limit such payment to materials in short and/or critical supply and materials specially fabricated for the Project each as defined in the Contract. When the Work or major portions thereof as contemplated by the terms of the Contract are Substantially Complete, the Contractor shall submit to the Architect a requisition for payment of the remaining amount of the Contract balance. Upon receipt of such requisition, the Owner shall approve and promptly pay the remaining amount of the Contract balance less two (2) times the values of any remaining items to be completed and an amount necessary to satisfy any claims, liens, or judgements against the Contractor which have not been suitably discharged.

9.10 Final Completion and Final Payment:

Add the following Subparagraphs to 9.10.1:

9.10.1.1 "In case the Contractor neglects to carry out the provisions of this clause within a reasonable time after notice, the Owner may cause all defects to be remedied and all repairs to be made without notice to the Contractor and deduct same from any amount so retained and recover the balance, if any, from the Contractor. The order of the Architect as to the conditions of the Work constructed under this Contract, the extent of the remedies applies, and of the repairs made, and of the cost thereof, shall be binding and conclusive upon the Contractor, his assigns, and sureties.

9.10.1.2 If the Work is not accepted by the Owner after final inspection and additional time is required to complete items identified during the final inspection, the date starting the one-year correction period described in Article 12 shall be set by the Architect at his discretion, but not later than the date of the final Certificate for Payment.

9.10.1.3 If the Architect is required to perform additional final inspections because the

Work fails to comply with the certifications of the Contractor identified in Division 01, the amount of compensation paid to the Architect by the Owner for additional services shall be deducted from the final payment to the Contractor.

Add the following Subparagraphs to 9.10.2:

9.10.2.1 In addition to the submittals required in Subparagraph 9.10.2 above, the Contractor shall submit separate release or waivers of liens for each subcontractor, material supplier, and others with lien rights against the property of the Owner and shall submit a list of such parties.

9.10.2.2 Submittals required above shall be made in accordance with procedures described in Division 01.

Add the following additional Clauses to Paragraph 9.10.4:

5. Claims for Indemnification;

6. Claims about which the Owner has given the Contractor written notice;

7. .Claims arising after final payment."

K. **Article 10 - Protection of Persons and Property**

10.2 Safety of Persons and Property:

Add the following Subparagraph to 10.2.2:

10.2.2.1 The Contractor acknowledges that the Labor Law of the State of New York, and regulations adopted thereunder, place upon both the Owner and the Contractor certain duties and that liability for failure to comply therewith is imposed on both the Owner and the Contractor regardless of their respective fault. The Contractor hereby agrees that, as between the Owner and the Contractor, the Contractor is solely responsible for compliance with all such laws and regulations imposed for the protection of persons performing the Contract. The Contractor shall indemnify and hold harmless the Owner of and from any and all liability for violation of such laws and regulations and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all Costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fee, in recovering such defense costs from the Contractor.

Add the following new Subparagraph:

10.2.9 Title to all completed or partially completed Work at the job site and to all materials delivered to and stored at said job site which are intended to become a part of the completed Work covered by the Contract, shall be in the name of the Owner. Notwithstanding the foregoing, prior to the acceptance of the completed Work by the Owner, the Contractor shall be liable for all loss of, or damage to, said completed Work, partially completed Work, materials furnished by the Contractor, and materials or equipment furnished by others, the custody of which has been given to the Contractor arising from any cause other than a cause against which the Owner herein undertakes to carry insurance. In the event of loss or damage from cause other than those against

which the Owner undertakes to carry insurance, the Contractor shall replace or repair the said Work materials at his own cost and expense, to the completed satisfaction of the Owner and Architect.

Add the following Subparagraph to 10.2.9:

10.2.9.1 The Contractor causing damage to the Work of another Contractor shall be responsible for the repair and replacement of such damaged Work. Back charges shall be made when corrections are not made promptly.

10.2.9.2 The Owner reserves the right to pay the Contractor originating the back charge from monies due the Contractor who is responsible for the Work required by same and shall deduct it from the amount due the said responsible Contractor.

10.2.9.3 Contractor originating back charges will determine the amount of the back charges in accordance with Article 7, Changes in the Work, of the General Conditions of the Contract, in order to obtain the Architect's approval.

10.2.9.4 Contractors under direct Contract with the Owner will be expected to take care of back charges originating with Subcontractors under their employ under the terms and conditions as established in the General Conditions of the Contract, Article 5 and Article 6. Contractors under direct Contract with the Owner, and their Sureties, shall indemnify and save the Owner harmless from claims of this type, including paying for legal expenses necessary to remove or settle any liens or other legal claims against the Owner.

L. **Article 11 - Insurance and Bonds**

11.1 Contractor's Insurance and Bonds:

Add the following Subparagraph to 11.1.1:

11.1.1.1 Liability insurance shall include all major divisions of coverage and be on comprehensive basis including:

1. Premises Operations (including X, C, and U coverage as applicable).
2. Independent Contractor's Protective.
3. Products and Completed Operations.
4. Personal Injury Liability with Employment Exclusion deleted.
5. Contractual, including specified provisions for Contractor's obligation under Paragraph 3.18.
6. Owned, non-owned, and hired motor vehicle.
7. Broad Form Property Damage including Completed Operations.

11.1.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than limits indicated in Division 01, Specification Section 010200 or greater as required by Law.

11.1.1.3 In addition to the Certificate of Insurance, the Contractor shall provide the Owner with copies of any endorsements subsequently issued amending

coverage or limits.

11.1.1.4 The Contractor shall provide insurance coverage for portions of the Work stored off the site, in transit, and stored on the site but not incorporated into the Work as full replacement cost basis without voluntary deductible.

11.1.1.5 The Owner as fiduciary shall have the power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power.

Add the following subparagraph to 11.1.2:

11.1.2.1 Bonds shall be obtained from a surety satisfactory to the Owner, licensed to do business in the state where the project is located. The amount of each bond shall be included in the Contract Sum. Each bond shall be maintained throughout the duration of the Project and shall remain in effect for a period of not less than two (2) years following final completion of the work by the Contractor.

Add the following subparagraph to 11.1.2:

11.1.2.2 The Contractor shall deliver the required bonds to the Owner prior to beginning construction activity at the site, but no later than three (3) days after execution of the Contract, on A.I.A. Document A312, Performance Bond and Payment Bond.

M. **Article 14 - Termination or Suspension of the Contract**

14.1 Termination by the Contractor:

Add the following to 14.1.1:

14.1.1.5 In accordance with Section 103.1, General Municipal Law, if any person when called to testify before a Grand Jury concerning any transaction or contract with the State of New York or a political subdivision thereof, or a public authority, or a public department, agency, or official of any of the foregoing, refuses to sign a waiver of immunity against subsequent criminal prosecution or refuses to answer any relevant questions concerning such transaction or contract; then any such person, or any firm, partnership, or corporation of which he is a member, partner, director, or official shall be disqualified for a period of five (5) years after such refusal from submitted bids to, receiving awards, or entering into any contract with, any municipal corporation or department or agency or official thereof.

If such person refuses to sign a waiver of immunity or to answer any relevant questions as aforesaid, then this Contract may be canceled or terminated by the Owner without the Owner incurring any penalty or damages by virtue of such cancellation or termination.

14.1.1.6 In accordance with Section 109, General Municipal Law, the Contractor shall not assign, transfer, convey, sublet, or otherwise dispose of the Contract for the Work herein specified, or his right, title, or interest therein, or his power to execute the Contract, to any other person or corporation without the previous consent in writing of the Board of Education.

If the Contractor, without previous written consent of the Board of Education, shall assign, transfer, convey, sublet, or otherwise dispose of the Contract for

the Work specified herein, or his power to execute the Contract, to any other person or corporation, the Board of Education shall be relieved of and discharged from any and all liability and obligations growing out of the Contract to the Contractor, and to the persons or corporation to which the Contract shall have been assigned, transferred, conveyed, sublet, or otherwise disposed of, and the Contractor, and his assignees, transferees, or sublessees shall forfeit and lose all monies theretofore earned under the Contract, except so much as may be required to pay his employees.

The above provisions of this paragraph shall not hinder, prevent, or affect any assignment by the Contractor for the benefit of his creditors made pursuant to the laws of the State of New York.

N. **Article 15 – Claims and Disputes**

15.1 Claims:

Paragraph 15.1.3.1, Notice of Claims, Delete the last sentence in its entirety.

Add the following at the end of subparagraph 15.1.5:

"The Contractor's Claim shall be made in writing within 21 days after the occurrence of the event giving rise to the Claim. Failure to do so shall be an irrevocable waiver of the Claim. Regardless of other provision in the Contract Documents to the contrary, the Contractor will not be entitled to damages or additional compensation from the Owner or Architect on account of delays caused by person, except as permitted under Paragraph 14.3."

Modify Paragraph 15.1.6.1 as follows:

Delete the text after "notice" in line 2 and substitute the following text and sentence, "shall be given by the Contractor to the Architect within 7 days of its commencement. The failure to give such notice shall constitute an irrevocable waiver of the Claim.

Delete from the second sentence the following, "of cost and"

Delete the third sentence, "In the case of a continuing delay, only one Claim is necessary." in its entirety.

Add the following Subparagraphs to 15.1.6.1:

15.1.6.1.1 An application for extension of time must set forth in detail the nature of each alleged cause of delay, the dates upon which such cause of delay began and ended, the number of days attributable to each of such causes, and the probable effect of such causes on the previously approved progress schedule.

15.1.6.1.2 Failure to strictly comply with these requirements may, at the discretion of the Owner, be deemed sufficient cause on the previously approved progress schedule.

Add the following Subparagraph to 15.1.6.2:

15.1.6.2.1 In planning his construction schedule within the agreed Contract Time, it shall be assumed that the Contractor has anticipated the amount of adverse weather conditions normal to the site of the Work for the season or seasons of the year involved. Only those weather delays attributable to other than normal weather conditions will be considered by the Architect.

Add the following paragraph to 15.1.6:

15.1.6.3 The Owner and/or Architect shall not be liable to the Contractor and/or Subcontractor for financial Claims or monetary damages of any nature caused by or arising out of delays. The sole remedy against the Owner for delays shall be the allowance of additional time for completion of the Work, the amount of which shall be subject to the Claims procedure set forth herein. Except to the extent, if any, expressly prohibited by law, the Contractor expressly agrees not to make any hereby waives any Claim for damages for delay, including, but not limited to, those resulting from increase labor or material costs; directions given or not given by the Owner, Architect, including scheduling and coordination of the Work; the Architect's preparation of drawings and specifications or review of shop drawings and requests for instruction(s); or, on account of any delay, obstruction or hinderance for any cause whatsoever by the Owner, Architect, or any other contractor on this Project, whether or not foreseeable or anticipated. The Contractor agrees that its sole right and remedy therefore shall be an extension of time if appropriate. IT IS EMPHASIZED THAT NO MONETARY RECOVERY MAY BE OBTAINED BY THE CONTRACTOR FOR DELAY AGAINST THE OWNER, CONSTRUCTION MANAGER, OR ARCHITECT BASED ON ANY REASON AND THAT THE CONTRACTOR'S SOLE REMEDY, IF APPROPRIATE, IS ADDITIONAL TIME.

Add the following subparagraphs to 15.1.8:

15.1.8.1 "The Contractor causing damage to the Work of another Contractor shall be responsible for the repair and replacement of such damaged Work. Back charges shall be made when corrections are not made promptly."

15.1.8.2 "The Owner reserves the right to pay the Contractor originating the back charge from monies due the Contractor who is responsible for the Work required by same and shall deduct it from the amount due the said responsible Contractor."

15.1.8.3 "Contractor originating back charges will determine the amount of the back charges in accordance with Article 7, Changes in the Work, of the General Conditions of the Contract, in order to obtain the Architect's approval."

15.1.8.4 "Contractors under direct Contract with the Owner will be expected to take care of back charges originating with Subcontractors under their employ under the terms and conditions as established in the General Conditions of the Contract, Article 5 and Article 6. Contractors under direct Contract with the Owner, and their Sureties, shall indemnify and save the Owner harmless from claims of this type, including paying for legal expenses necessary to remove or settle any liens or other legal claims against the Owner."

15.2 Initial Decision:

Add to end of 15.2.1:

Add the following text at the end of the third sentence of this Subparagraph:…"provided, with respect to Claims submitted more than one year after payment is due, the decision by the Architect shall not be a condition precedent to litigation, and the Claim not need be submitted to the Architect.

Delete Paragraph 15.2.6.1 in its entirety and replace with the following:

15.2.6.1 When a written decision of the Architect states that (1) the decision is final but subject to mediation and (2) a demand for mediation of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand mediation within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after mediation proceedings have been initiated, such decision may be entered as evidence, but shall not supersede mediation proceedings unless the decision is acceptable to all parties concerned.

Add the following Paragraph 15.2.9:

"Within 10 days of a written request, the Contractor will make available to the Owner or its representative books, records, or other documents in its possession or to which it has access relating to a claim and shall require its Subcontractors, regardless of tier, and materialmen to do likewise."

15.3 Mediation:

Delete the last sentence from Paragraph 15.3.2.

15.4 Arbitration:

Delete this Paragraph in its entirety.

O. **Add the following new article in its entirety**

Article 16 - Governmental Stipulations

16.1 Non-Discrimination:

16.1.1 The parties to this Contract agree to incorporate into this Contract the mandatory language of Subsection 3.4 (a) of the Regulation promulgated by the Treasurer pursuant to P.L. 1975, c. 127, as amended and supplemented from time to time, and the Contractor or subcontractor agrees to comply fully with the terms, provisions, and obligations of said Subsection 3.4 (a) provided that said subsection shall be applied subject to the term of Subsection 3.4 (d) of said Regulations.

16.1.2 The parties to this Contract agree to incorporate into this Contract the mandatory language of Subsections 7.4 (a) and (b) of the Regulations promulgated by the Treasurer pursuant to P.L. 1975, c. 127, as amended and supplemented from time to time, and the Contract of subcontractor agrees to comply fully with the terms, provisions, and obligations of Subsection 7.4 (a) and (b).

16.2 Prevailing Wages:

16.2.1 The Wage rate which can be paid to Workmen employed in the performance of the Contract shall be no less than the rates of wages as promulgated by the Department of Labor and Industry of the State for the location and duration of this project.

P. **Add the following new article in its entirety**

Article 17-Indemnification

17.1.1 The Contractor and its Subcontractors shall indemnify and hold harmless the Owner, Architect and the Construction Manager, and all their employees, agents or servants or any third parties from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses, including but not limited to attorneys' fees, which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor, or any of its Subcontractors, or any person or firm directly or indirectly employed by such Contractor, for the act(s) and/or omission(s) of any Contractor or Subcontractor in connection with the work of the Project.

17.1.2 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, the Architect, the Architect's consultants, and agents and employees of them from and against claims, damages, losses and expenses, including but not limited to, attorneys' fees arising out of or resulting from performance of its work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction, of tangible property including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this paragraph 16.1.2. The Contractor's indemnity obligations under this Paragraph 16.1.2 shall, but not by way of limitation, specifically include all claims and judgments which may be made against the Owner, the Construction Manager, the Architect, the Architect's consultants and agents and employees of any of them under any applicable statute, rule or regulation including the New York Statute, Occupational Safety and Hazardous Act, and the Federal Occupational Safety and Hazardous Act. In claims against any person or entity indemnified under this paragraph 16.1.2 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this paragraph 16.1.2 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

17.1.3 The Contractor shall indemnify and hold harmless: (1) the Owner, its consultants, employees, officers and agents; (2) the Construction Manager; and (3) the Architect and its consultants, employees, officers and agents, against any actions, lawsuits or proceedings or claims of liens brought against each or any of them as a result of liens filed against the Contractor's project funds, including all the cost and expense of said liens, and including but not limited to attorneys' fees incurred by each or any of them.

17.1.4 The Contractor shall indemnify and hold harmless the Owner, the Construction Manager, and the Architect of and from any and all liability for violation of any laws and regulations applicable to the Contractor's work and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

17.1.5 The Contractor shall indemnify and hold harmless the Owner, the Construction Manager, and the Architect of and from any and all liability for claims made by third parties, including subcontractors, in connection with this Agreement and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

END OF SECTION

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.
/
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User Notes: (1731604324)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

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§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

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§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

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User Notes: (1731604324)

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Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

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§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

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§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

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Application and Certificate for Payment Instructions

The following AIA Document G702 or G732 and G703 shall be utilized.

The General Conditions and Supplemental Conditions (if any) state required accompanying documents.

Applications and Certificates for Payment shall be assembled and transmitted as follows:

- Provide four original Applications and Certificates for Payment if there is a Construction Manager, three originals if not. One original and photocopies are unacceptable.
- If there is a Construction Manager, utilize the Construction Manager-edition AIA Application and Certificate for Payment, and the Construction Manager must have signed all originals before transmitting them to BBS.
- Lien Releases and Affidavits are required for every Application and Certificate for Payment except the first.
- Certified Payroll is required for every Application and Certificate for Payment that includes any amount of labor.
- The first Application and Certificate for Payment will not be processed until acceptable Bonds and Insurances are submitted and approved.
- The first Application and Certificate for Payment that includes any amount of labor, and thus Certified Payroll, must contain OSHA 10 cards. OSHA 10 cards must also be provided on subsequent Applications and Certificates for Payment where any new or additional worker is employed.
- The four or three original Applications and Certificates for Payment shall be complete and separate packages; all attachments must be affixed to every original application.

The Architect/Engineer and/or Construction Manager will not disassemble, rearrange, or reproduce any Application and Certificate for Payment, or portion thereof, to bring them into compliance. Incomplete or improperly arranged Applications and Certificates for Payment will be rejected and returned to the Contractor.

AIA® Document G732™ – 2009

Application and Certificate for Payment, Construction Manager as Adviser Edition

TO OWNER:

PROJECT: Tempalte

APPLICATION NO:

DISTRIBUTION TO:
OWNER
CONSTRUCTION MANAGER
ARCHITECT
CONTRACTOR
FIELD
OTHER

PERIOD TO:

CONTRACT DATE:

PROJECT NOS: / /

FROM CONTRACTOR:

CONTRACT FOR: General Construction

VIA CONSTRUCTION MANAGER:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703™, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM		$
2. NET CHANGES IN THE WORK		$ 0.00
3. CONTRACT SUM TO DATE *(Line 1 ± 2)*		$ 0.00
4. TOTAL COMPLETED AND STORED TO DATE *(Column G on G703)*		$
5. RETAINAGE:		
a. 0 % of Completed Work *(Column D + E on G703)*	$ 0.00	
b. 0 % of Stored Material *(Column F on G703)*	$ 0.00	
Total Retainage *(Lines 5a + 5b, or Total in Column I on G703)*		$ 0.00
6. TOTAL EARNED LESS RETAINAGE *(Line 4 minus Line 5 Total)*		$ 0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT *(Line 6 from prior Certificate)*		$
8. CURRENT PAYMENT DUE		$ 0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE *(Line 3 minus Line 6)*	$ 0.00	

SUMMARY OF CHANGES IN THE WORK	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$	$
Total approved this month including Construction Change Directives	$	$
TOTALS	$ 0.00	$ 0.00
NET CHANGES IN THE WORK	$ 0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on evaluations of the Work and the data comprising this application, the Construction Manager and Architect certify to the Owner that to the best of their knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

CONSTRUCTION MANAGER:

By: _____ Date: _____

ARCHITECT: *(NOTE: If Multiple Prime Contractors are responsible for performing portions of the Project, the Architect's Certification is not required.)*

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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AIA® Document G703™ – 1992

Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
						0.00	0.00 %	0.00	
	GRAND TOTAL	$0.00	$0.00	$0.00	$0.00	$0.00	0.00 %	$0.00	$0.00

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AGENCY CUSTOMER ID: _____

NEW YORK CONSTRUCTION CERTIFICATE OF LIABILITY INSURANCE ADDENDUM

DATE (MM/DD/YYYY)

THIS ADDENDUM SUMMARIZES SOME OF THE POLICY PROVISIONS IN THE REFERENCED INSURANCE POLICIES AND IS ISSUED AS A MATTER OF INFORMATION ONLY; IT CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. ALL TERMS, EXCLUSIONS AND CONDITIONS IN THE ACTUAL POLICY SHOULD BE CONSULTED FOR A MORE DETAILED ANALYSIS OF COVERAGE, AS THIS ADDENDUM DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES.

AGENCY		NAMED INSURED(S)	
POLICY NUMBER	EFFECTIVE DATE	CARRIER	NAIC CODE

ADDENDUM INFORMATION **CERTIFICATE NUMBER:** **REVISION NUMBER:**

A. Insurer

☐ Admitted / authorized

☐ Excess line or free trade zone

B. General Liability (GL) policy form

☐ ISO / ISO modified

☐ Other

C. Specific operations excluded or restricted (GL policy)

☐ Location: _____

☐ Type of construction: _____

☐ Building height: _____

☐ Classifications [see attached declarations / endorsement]

☐ Designated work [see attached endorsement]

D. Additional insured endorsement (GL policy)

☐ CG 20 10 ☐ CG 20 26 ☐ CG 20 32 ☐ CG 20 33 ☐ CG 20 37 ☐ CG 20 38

☐ Other: #: _____ Title: _____

E. According to the terms of this GL policy, the additional insured has primary and noncontributory coverage

☐ Yes ☐ No and ☐ no other option is available with this insurer

F. Additional insured will receive advance notice if insurer cancels (GL policy)

☐ Yes ☐ No and ☐ no other option is available with this insurer

G. Blanket contractual liability located in the "insured contract" definition (Section V, Number 9, Item f. in the ISO CGL policy) is removed or restricted

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

H. "Insured contract" exception to the employers liability exclusion is removed or modified (GL policy)

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

I. GL policy (including endorsements) does not cover the additional insured for claims involving injury to employees of the named insured or subcontractors (not workers' compensation)

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

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J. Earth movement, excavation or explosion / collapse / underground property damage is excluded or restricted (GL policy)

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

K. Insured vs. insured suits (cross liability in the ISO CGL policy) are excluded or restricted (other than named insured vs. named insured)

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

L. Property damage to work performed by subcontractors (exception to the "damage to your work" exclusion in the ISO CGL policy) is excluded or restricted

☐ Yes and ☐ no other option is available with this insurer ☐ No changes made

M. Excess / umbrella policy is primary and non-contributory for additional insureds

☐ Yes, by specific policy provision ☐ Yes, by endorsement ☐ No and ☐ no other option is available with this insurer

_____ _____

AUTHORIZED REPRESENTATIVE SIGNATURE DATE (MM/DD/YYYY)

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. **Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – AUTOMATIC STATUS FOR OTHER PARTIES WHEN REQUIRED IN WRITTEN CONSTRUCTION AGREEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. **Section II – Who Is An Insured** is amended to include as an additional insured:

1. Any person or organization for whom you are performing operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy; and

2. Any other person or organization you are required to add as an additional insured under the contract or agreement described in Paragraph **1.** above.

Such person(s) or organization(s) is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

a. Your acts or omissions; or

b. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured.

However, the insurance afforded to such additional insured described above:

a. Only applies to the extent permitted by law; and

b. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

A person's or organization's status as an additional insured under this endorsement ends when your operations for the person or organization described in Paragraph **1.** above are completed.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to:

1. "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:

a. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or

b. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of, or the failure to render, any professional architectural, engineering or surveying services.

2. "Bodily injury" or "property damage" occurring after:

a. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or

SAMPLE

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b. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement described in Paragraph **A.1.;** or

2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

SAMPLE

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BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

FREDERICK W. SEEBA, PE, MANAGING PARTNER
LAWRENCE SALVESEN, AIA, PARTNER
KEVIN J. WALSH, AIA, PARTNER
KENNETH G. SCHUPNER, AIA, PARTNER
JOSEPH B. RETTIG, AIA, PARTNER
GARY W. SCHIEDE, AIA, PARTNER
ROGER P. SMITH, AIA, FOUNDING PRINCIPAL

Date: _____

Owner: _____

Project: _____

Contractor: _____

Dear Sir/Madam:

Reference is made to your contract with _____ for the above referenced Project. By signing below, you hereby acknowledge and agree, that for valuable consideration, the receipt of which is acknowledged, you covenant and agree that BBS Architects, Landscape Architects & Engineers PC, shall be added as an "additional insured" to your casualty and commercial liability insurance policies required under the Contract, including all primary and excess policies, limits, and terms and conditions contained therein, and further agree that an insurance certificate and endorsement confirming that this entity was added as an "additional insured" on such policies of insurance shall be provided by you prior to the commencement of work on the Project.

In addition, you further covenant and agree to hold harmless, indemnify and defend BBS Architects, Landscape Architects, and Engineers, PC to the same extent that you are required to hold harmless, indemnify and defend the Owner under the Contract, however, Contractor is not responsible for defense and indemnity for claims, demands or suits caused solely by Architect's professional negligence.

Acknowledged and agreed to by:

_____
Name

_____
Signature

_____
Contractor

Rev. 08-06-24

Insurance Certification

Bid or Project No.:
SED 66-03-01-03-0-002-012

Name of Project: The Waverly School

Your insurance representative must complete the form below in order to be considered for the award of this bid or project, and it is important that you complete the Bidder's Acknowledgement section of this form. Please note that this Insurance Certification form must accompany your bid submission in order for your bid to be considered.

Insurance Representative's Acknowledgement:

We have reviewed the insurance requirements set forth in the AIA 232 – Article 11 of the specifications and are capable of providing such insurance to our insured in accordance with such requirements in the event the contract is awarded to our insured and provided our insured pays the appropriate premium.

Insurance Representative:

_____

Address:

_____

_____

Are you an agent for the companies providing the coverage? Yes_____No_____

Date:_____ _____

Insurance Representative Signature

Bidder's Acknowledgement:

I acknowledge that I have received the insurance requirements of this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that this Insurance **Certification form must be submitted with my bid and my inability to provide the required insurances may result in the rejection of my bid, and the Eastchester Union Free School District may award the contract to the next lowest/responsive bidder.**

Firm name: _____

Address: _____

_____

Date:_____ _____

Bidder's Signature

AIA® Document G705™ – 2001

List of Subcontractors

PROJECT: *(Name and address)*

DATE:

TO ARCHITECT: *(Name and address)*
BBS Architects, Landscape Architects & Engineers, PC
244 E Main St
Patchogue, NY 11772

ARCHITECT'S PROJECT NUMBER:

FROM CONTRACTOR: *(Name and address)*

CONTRACTOR'S PROJECT NUMBER:

(List Subcontractors and others proposed to be employed on the above Project as required by the bidding documents.)

Work/Firm Name	Address/Phone	Superintendent

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AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
		ARCHITECT: ☐
	CONTRACT FOR:	CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐
		OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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AIA® Document G706A™ – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
		ARCHITECT: ☐
		CONTRACTOR: ☐
	CONTRACT FOR:	SURETY: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
	CONTRACT FOR:	ARCHITECT: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	CONTRACTOR: ☐
		SURETY: ☐
		OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

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Consent of Surety to Reduction in or Partial Release of Retainage

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
	CONTRACT FOR:	ARCHITECT: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	CONTRACTOR: ☐
		SURETY: ☐
		OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves the reduction in or partial release of retainage to the Contractor as follows:

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

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Kathy Hochul, Governor

Roberta Reardon, Commissioner

Eastchester UFSD

John Prentice
244 E. Main Street
Patchogue NY 11776

Schedule Year	2026 through 2027
Date Requested	09/17/2026
PRC#	2026027170

Location	Eastchester UFSD
Project ID#	25-139a
Project Type	Improvements to various buildings

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Rate Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2026 through June 2027. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Contractor Registry

Effective December 30, 2024 all contractors and subcontractors submitting bids or performing construction work on public work projects, or private projects covered by Article 8 of the Labor Law, are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. To register, contractors and subcontractors must submit an application through NYSDOL's Contractor Registry portal which is available through the agency's Management System for Protecting Worker Rights (MPWR) https://mpwr-public.labor.ny.gov/en/login.

For additional information, please visit online.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12226; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website

www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment.Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12226 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

Kathy Hochul, Governor

Roberta Reardon, Commissioner

Eastchester UFSD

John Prentice
244 E. Main Street
Patchogue NY 11776

Schedule Year 2026 through 2027
Date Requested 09/17/2026
PRC# 2026027170

Location Eastchester UFSD
Project ID# 25-139a
Project Type Improvements to various buildings

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information
All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:
[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, https://dol.ny.gov/public-work-and-prevailing-wage
If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

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1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12226

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

NEW YORK STATE OF OPPORTUNITY. Department of Labor

Required Notice under Article 25-B of the Labor Law

Attention All Employees, Contractors and Subcontractors: You are Covered by the Construction Industry Fair Play Act

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor**, you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

• **Civil Penalty**	First offense: Up to $2,500 per employee Subsequent offense(s): Up to $5,000 per employee
• **Criminal Penalty**	First offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing public work for up to one year. Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a $50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)

WE ARE YOUR DOL

NEW YORK STATE Department of Labor

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Your pay stub and wage notice received upon hire must clearly state your wage rate and supplement rate.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at: https://dol.ny.gov/bureau-public-work

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5287		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is $250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training “prior to the performing any work on the project.”

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.)*
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is $3 million in Bronx, Kings, New York, Queens and, Richmond counties; $1.5 million in Nassau, Suffolk and Westchester counties; and $500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.
Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.
Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.
Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

*Contractor Registry (LL 220-I):
Labor Law Section 220-i requires that contractors obtain a Contractor Registry certificate of registration prior to bidding on or commencing work on a public or private project subject to prevailing wage requirements. Subcontractors also are prohibited from commencing work on covered employment unless they have received a Contractor Registry certificate. Contractors are required to submit their Certificate of Registration with their bid materials. A public database is available online to confirm registration at data.ny.gov to confirm registration validity. For additional information on how to register and the requirements, visit https://dol.ny.gov/public-work-contractor-and-subcontractorregistry-
landing.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three (3) years from the projects date of completion. Additionally, as per Article 6 of the Labor Law, contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

At a minimum, payrolls must show the following information for each person employed on a public work project: Name; Address, Last 4 Digits of Social Security number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

Payroll records and transcripts are required to be kept on site during all the time that work under that contract is being performed.

NOTE: *For more detailed information regarding Article 9 prevailing wage contracts, please refer to "General Provisions of Laws Covering Workers on Article 9 Public Work Building Service Contracts".*

If you have any questions concerning the attached schedule or would like additional information, please write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

OR

Contact the nearest BUREAU of PUBLIC WORK District Office

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518

Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. The specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. Please Note: Updates to the Wage Schedule shall be made on a quarterly basis.

All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Shift Work

If the timeline of the contract requires shift work be performed to meet deadlines, the BPWE will enforce the shift work rate as the required rate on the project whether or not shift work is specifically addressed in the contract.

Paid Prenatal Leave

Every employer shall be required to provide to its employees twenty hours of paid prenatal personal leave during any fifty-two week calendar period. Paid prenatal personal leave shall mean leave taken for the health care services received by an employee during their pregnancy or related to such pregnancy, including physical examinations, medical procedures, monitoring and testing, and discussions with a healthcare provider related to the pregnancy. Paid prenatal personal leave may be taken in hourly increments. Benefits for paid prenatal personal leave shall be paid in hourly installments. Employees shall receive compensation at the employee's regular rate of pay, or the applicable minimum wage established by the labor law, whichever is greater, for the use of Paid Prenatal leave.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4

Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12226

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Westchester County General Construction

Boilermaker — 09/01/2026

JOB DESCRIPTION Boilermaker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2026	01/01/2027
Boilermaker	$ 70.38	$ 71.88
Repairs & Renovations	70.38	71.88

Repairs & Renovation: Includes Repairing, Renovating, and Replacement of parts to an existing unit(s).

SUPPLEMENTAL BENEFITS
Per Hour:

Boilermaker	33.5% of Hourly
Repair & Renovations	Wage Paid + $26.85

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

OVERTIME PAY
See (*B, O, **U) on OVERTIME PAGE
Note:* Includes 9th & 10th hours, double for 11th or more.
** Labor Day ONLY, if worked.

Repairs & Renovation see (B,E,Q) on OT Page

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 12, 15, 25, 26, 29) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1/2) Year Terms at the following percentage of Boilermaker's wage per hour:

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

SUPPLEMENTAL BENEFITS:

33.5% of Hourly Wage Paid Plus Amount Below:

1st	2nd	3rd	4th	5th	6th	7th
$20.36	$21.28	$22.22	$23.12	$24.07	$25.00	$25.93

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Broadband — 09/01/2026

JOB DESCRIPTION Broadband **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

PARTIAL COUNTIES
Orange: Entire County except Village of Greenwood Lake, Village of Highland Falls, Town of Tuxedo, and Town of Patterson

WAGES
NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to New York State Labor Law §224-E, solicited on or after July 1,2025. For all other projects solicited prior to July 1,2025 please see LINEMAN ELECTRICIAN(1)-TELEDATA

Per Hour:	07/01/2026	08/04/2026
Field Tech Install/Repair*	$ 55.59	$ 57.26

For outside work (excluding installation on building construction/alteration/renovation projects), stopping at first point of attachment (demarcation), installing/maintaining/repairing broadband internet service.

"Broadband", "Broadband Service", or "Broadband Internet" means mass-market retail service by wire or radio that provides the capability to transmit data to and receive data from all or substantially all internet endpoints, including any capabilities that are incidental to and enable the operation of the communications service, but excluding dial-up internet access service.

*NOTE: EXCLUDES work within ten(10) feet of High Voltage (600 Volts and over) transmussion lines. Please see LINEMAN rates.
*NOTE: Does not include the operation of equipment. Please see OPERATING ENGINEER rates.
*NOTE: Does not include groundmen/flagger/flagmen. Please see LABORER/LABORER-HEAVY/HIGHWAY rates.

SUPPLEMENTAL BENEFITS
Per Hour:

$ 23.54

OVERTIME PAY
See (B, K, *R) on OVERTIME PAGE
*Two and one half times the hourly rate after the 8th hour

HOLIDAY
Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

4-CWA-Dist1

Carpenter — 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per hour: 07/01/2026

Piledriver $ 62.59 + 10.16*

Dockbuilder $ 62.59 + 10.16*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 47.48

OVERTIME PAY
See (B, E2, O) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.
Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour
(1)year terms:

1st	2nd	3rd	4th
$ 28.98 + 5.66*	$ 34.58 + 5.66*	$ 42.96 + 5.66*	$ 51.35 + 5.66*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental benefits per hour:

All Terms: $ 34.03

8-1556 Db

Carpenter — 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per hour: 07/01/2026

Carpet/Resilient
Floor Coverer $ 60.05
+ 8.39*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS
Per hour:
$ 42.24

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.
Apprentices See (5,6,11,13,16,18,19,25)
Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wage per hour - (1) year terms:

1st	2nd	3rd	4th
$ 26.54	$ 29.60	$ 34.05	$ 42.40
+ 2.00*	+ 2.54*	+ 3.00*	+ 3.94*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 16.91	$ 18.13	$ 21.67	$ 22.98

8-2287

Carpenter 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per Hour: 07/01/2026

Marine Construction:

Marine Diver $ 77.46
+ 10.16*

Marine Tender $ 57.00
+ 10.16*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker $ 47.48

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18, 19) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 13, 16, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year terms.

1st year	$ 28.98
	+ 5.66*
2nd year	34.58
	+ 5.66*
3rd year	42.96
	+ 5.66*
4th year	51.35
	+ 5.66*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental Benefits
Per Hour:

All terms	$ 34.03

8-1456MC

Carpenter — 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per hour: 07/01/2026

Building

Millwright	$ 62.03
	+ 13.12*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SUPPLEMENTAL BENEFITS
Per hour:

Millwright	$ 46.66

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18,19) on HOLIDAY PAGE.

Overtime: See (5,6,8,11,13,15,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour:
One (1) year terms:

1st.	2nd.	3rd.	4th.
$ 33.04	$ 38.89	$ 44.74	$ 56.44
+ 7.08*	+ 8.25*	+ 9.42*	+ 11.76*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental benefits per hour:
One (1) year terms:

1st.	2nd.	3rd.	4th.
$ 31.81	$ 34.34	$ 37.52	$ 41.94

8-740.1

Carpenter — 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES
Per Hour:

	07/01/2026
Timberman	$ 57.59
	+ 10.42*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SUPPLEMENTAL BENEFITS
Per Hour:
$ 46.79

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Overtime: See (5, 6, 11, 13, 25) on HOLIDAY PAGE
Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.
Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour:
One (1) year terms:

1st	2nd	3rd	4th
$ 26.96	$ 32.07	$ 39.72	$ 47.38
+ 5.71*	+ 5.71*	+ 5.71*	+ 5.71*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental benefits per hour:
All terms $ 33.78

8-1556 Tm

Carpenter — 09/01/2026

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES
Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.
Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.
Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour:	07/01/2026	10/18/2026
Core Drilling:		
Driller	$ 48.78	Additional
	+ 3.85*	+ $2.63
Driller Helper	$ 38.15	
	+ 3.85*	

Note: Hazardous Waste Pay Differential:
For Level C, an additional 15% above wage rate per hour
For Level B, an additional 15% above wage rate per hour
For Level A, an additional 15% above wage rate per hour
Note: Additional $3.00 per hour to be paid when required to work on water

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SUPPLEMENTAL BENEFITS
Per hour:

Driller and Helper $ 32.37

OVERTIME PAY
See (B, G, P) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 13, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 13, 25) on HOLIDAY PAGE

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway — 09/01/2026

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

WAGES
WAGES:(per hour)
Applies to CARPENTER BUILDING/HEAVY & HIGHWAY/TUNNEL:

	07/01/2026
Base Wage	$ 43.68
	+$6.69*

*For all hours paid straight or premium.

SHIFT WORK
SHIFT DIFFERENTIAL: When it is mandated by a Government Agency irregular or off shift can be worked. The Carpenter shall receive an additional fifteen percent (15%) of wage plus applicable benefits.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 33.11

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
BUILDING:
Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.
- Holidays that fall on Sunday will be observed Monday.

HEAVY&HIGHWAY/TUNNEL:
Paid: See (5, 6, 25) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- Holidays that fall on Sunday will be observed Monday
- Must be employed during the five (5) work days immediately preceding a holiday or during the five (5) work days following the paid holiday to receive holiday pay
- If an employee is entitled to a paid holiday, the employee is paid the Holiday wage and supplemental benefits whether they work or not. If an employee works the Holiday, the employee will receive holiday pay (including supplemental benefits), plus the applicable premium wage for working the Holiday. If an employee works in excess of 8 hours on Holiday, then benefits will be paid for any hours in excess of 8 hours.

REGISTERED APPRENTICES
1 year terms at the following wage rates:

1st	2nd	3rd	4th
$ 21.84	$ 26.21	$ 30.58	$ 34.94
+3.86*	+3.86*	+3.86*	+3.86*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms	$ 17.76

11-279.1B/HH

Electrician — 09/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, New York, Queens, Richmond, Westchester

WAGES

Per hour:	07/01/2026	03/12/2027
Service Technician	$ 39.45	$ 40.45

Service and Maintenance on Alarm and Security Systems.

Maintenance, repair and /or replacement of defective (or damaged) equipment on, but not limited to, Burglar - Fire - Security - CCTV - Card Access - Life Safety Systems and associated devices. (Whether by service contract of T&M by customer request.)

SUPPLEMENTAL BENEFITS

Per hour:		
Journeyworker:	$ 23.33	$ 24.11

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

9-3H

Electrician 09/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 8

ENTIRE COUNTIES
Westchester

WAGES

Per hour:	07/01/2026	04/15/2027
Electrician/A-Technician	$ 58.75	$ 60.75
Teledata	58.75	60.75

See "M" rate for all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls.

Note: On a job where employees are required to work on bridges over navigable waters, transmission towers, light poles, bosun chairs, swinging scaffolds , etc. 40 feet or more above the water or ground or under compressed air, or tunnel projects under construction or where assisted breathing apparatus is required, they will be paid at the rate of time and one-half for such work except on normal pole line or building construction work.

SUPPLEMENTAL BENEFITS

Per hour:		
Journeyworker	$ 65.07	$ 67.55

OVERTIME PAY
See (A, G, *J, P) on OVERTIME PAGE
*NOTE: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES
(1) year terms at the following wage rates:

	07/01/2026	04/15/2027
1st term	$ 18.00	$ 18.00
2nd term	19.50	19.50
3rd term	21.00	21.00
4th term	22.50	22.50
MIJ 1-12 months	28.25	28.25

MIJ 13-18 months	31.75	31.75

Supplemental Benefits per hour:

	07/01/2026	04/15/2027
1st term	$ 15.23	$ 15.73
2nd term	18.75	19.25
3rd term	19.77	20.27
4th term	20.78	21.28
MIJ 1-12 months	16.56	17.06
MIJ 13-18 months	17.02	17.52

8-3/W

Electrician — 09/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 8

ENTIRE COUNTIES
Westchester

WAGES
Per hour

	07/01/2026	04/15/2027
Electrician - M	$ 34.25	$ 34.25

"M" rate for all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls.

SUPPLEMENTAL BENEFITS

	07/01/2026	04/15/2027
Electrician - M	$ 17.35	$ 17.85

OVERTIME PAY
See (B, G, *J, P) on OVERTIME PAGE
*Note: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

8-3m

Elevator Constructor — 09/01/2026

JOB DESCRIPTION Elevator Constructor **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES
Rockland: Entire County except for the Township of Stony Point
Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES
Per hour:

	07/01/2026	03/17/2027
Elevator Constructor	$ 86.43	$ 89.76
Modernization & Service/Repair	$ 68.06	$ 70.72

SUPPLEMENTAL BENEFITS
Per Hour:

Elevator Constructor	$ 48.96	$ 50.27

Modernization & Service/Repairs	$ 47.73	$ 49.00

OVERTIME PAY
Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, E5, P) on OVERTIME PAGE.

HOLIDAY
Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES PER HOUR:

6 MONTH TERMS:

1st Term*	2nd & 3rd Term*	4th & 5th Term	6th & 7th Term	8th & 9th Term
50%	50%	55%	65%	75%

* Note: 1st, 2nd, 3rd Terms are based on average of the Constructor, the Modernization and the Service/Repair wage.
Terms 4 thru 9 Based on the Journeyworker's wage of classification they are working in.

SUPPLEMENTAL BENEFITS:

	07/01/2026	03/17/2027
Elevator Constructor		
1st Term	$0.00	$ 0.00
2nd & 3rd Term	37.66	38.42
4th & 5th Term	38.80	39.62
6th & 7th Term	40.60	41.50
8th & 9th Term	42.39	43.39
Modernization & Service/Repair		
1st Term	$0.00	$ 0.00
2nd & 3rd Term	37.63	38.39
4th & 5th Term	38.37	39.17
6th & 7th Term	40.09	40.98
8th & 9th Term	41.81	42.79

Elevator Constructor — 09/01/2026

JOB DESCRIPTION Elevator Constructor **DISTRICT** 1

ENTIRE COUNTIES
Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, Ulster

PARTIAL COUNTIES
Delaware: Towns of Andes, Bovina, Colchester, Davenport, Delhi, Harpersfield, Hemdon, Kortright, Meredith, Middletown, Roxbury, Hancock & Stamford
Rockland: Only the Township of Stony Point.
Westchester: Only the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per Hour	07/01/2026	01/01/2027
Mechanic	$ 76.12	$ 79.37
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 38.985*	$ 39.535*

*NOTE: Add 6% of regular hourly rate for all hours worked. Add 8% of regular hourly rate if more than 5 years of service.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

Note: When a paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES per hour: 1 year terms at the following percentage of the Elevator Constructor Mechanic wage.

0-6 months	6-12 months	2nd year	3rd year	4th year
50%	55%	65%	70%	80%

SUPPLEMENTAL BENEFITS per hour:

0-6 months: 6% of the regular hourly apprentice rate paid, no additional supplemental benefits.

All other terms: Same as Journeyworker

1-138

Glazier — 09/01/2026

JOB DESCRIPTION Glazier **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES
Per hour:

	07/01/2026	11/01/2026
Glazier	$ 66.22	$ 67.20
Scaffolding, including swing scaffold	71.22	72.20
*Mechanical Equipment	67.23	68.20
**Repair & Maintenance	32.82	33.47

*Mechanical equipment, scissor jacks, man lifts, booms & buckets 30' or more, but not pipe scaffolding.
**Repair & Maintenance- All repair & maintenance work on a particular building whenever performed, where the total cumulative Repair & Maintenance contract value is under $202,000.

SUPPLEMENTAL BENEFITS
Per hour:

Glazier, Scaffolding and Mechanical Equipment	$ 44.81	$ 45.74
Repair & Maintenance	$ 26.01	$26.37

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE
For 'Repair & Maintenance' see (B, B2, I, S) on overtime page.

HOLIDAY
Paid: See (5, 6, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE
For 'Repair & Maintenance'
Paid: See(5, 6, 16, 25)
Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES
Wage per hour:
(1) year terms at the following wage rates:

	07/01/2026	11/01/2026
1st term	$ 23.68	$ 24.06
2nd term	32.23	32.74
3rd term	42.89	43.55
4th term	52.47	53.23

Supplemental Benefits:
(Per hour)

1st term	$ 20.18	$ 20.56
2nd term	28.85	29.39
3rd term	34.77	35.45
4th term	38.18	38.95

8-1087 (DC9 NYC)

Insulator - Heat & Frost — 09/01/2026

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour:	07/01/2026
Insulator/Fire Stop Work*	$ 64.27
Discomfort & Additional Training**	67.32

*Applies on all exclusive Fire Stop Work (When contract is for Fire Stop work only). No apprentices on these contracts only.

**Applies to work requiring; garb or equipment worn against the body not customarily worn by insulators; psychological evaluation ;special training, including but not limited to "Yellow Badge" radiation training

Note: Additional $10 a day for work 30 feet or more above floor or ground level.

SUPPLEMENTAL BENEFITS

Per hour:	
Insulator/Fire Stop Journeyworker:	$ 39.85
Discomfort & Additional Training:	$ 41.89

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Note: Last working day preceding Christmas and New Years day, workers shall work no later than 12:00 noon and shall receive 8 hrs pay.

Overtime: See (2*, 4, 6, 16, 25) on HOLIDAY PAGE.
*Note: Labor Day triple time if worked.

REGISTERED APPRENTICES
(1) year terms:

Insulator Apprentices:

1st	2nd	3rd	4th
$ 35.09	$ 40.92	$ 46.76	$ 52.60

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
$ 36.61	$ 42.75	$ 48.89	$ 55.04

Supplemental Benefits paid per hour:

Insulator Apprentices:

1st term	$ 20.33
2nd term	24.23
3rd term	28.13
4th term	32.05

Discomfort & Additional Training Apprentices:

1st term	$ 21.34
2nd term	25.46
3rd term	29.56

4th term	33.68

8-91

Ironworker **09/01/2026**

JOB DESCRIPTION Ironworker **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:	07/01/2026	01/01/2027 Additional
Stone Derrickmen Rigger	$ 78.46	$ 1.84
Stone Handset Derrickman	$ 76.51	$ 1.64

SUPPLEMENTAL BENEFITS

Per hour:	
Stone Derrickmen Rigger	$ 49.02
Stone Handset Derrickman	$ 48.01

OVERTIME PAY
See (B, D1, *E, Q, **V) on OVERTIME PAGE
*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.
** Benefits same premium as wages on Holidays only

HOLIDAY
Paid: See (18) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 25) on HOLIDAY PAGE
Work stops at schedule lunch break with full day's pay.

REGISTERED APPRENTICES
Wage per hour:

Stone Derrickmen Rigger:

	1st	2nd	3rd	4th
07/01/2026	$ 38.98	$ 55.17	$ 61.37	$ 67.56

Supplemental Benefits:
Per hour:

07/01/2026	$ 24.77	$ 37.34	$ 37.34	$ 37.34

Stone Handset:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2026	$ 37.51	$ 53.51	$ 59.51	$ 65.51

Supplemental Benefits:
Per hour:

07/01/2026	$ 24.75	$ 36.90	$ 36.90	$ 36.90

9-197D/R

Ironworker **09/01/2026**

JOB DESCRIPTION Ironworker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:	07/01/2026	01/01/2027 Additional
Ornamental	$ 48.65	$ 1.05*
Chain Link Fence	48.65	

Guide Rail 48.65

* To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker: $ 68.84

OVERTIME PAY
See (B, B1, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
1 year terms at the following wages per hour:

1st	2nd	3rd	4th
$ 25.98	$ 28.45	$ 30.80	$ 34.39

Supplemental Benefits per hour:

1st	2nd	3rd	4th
$ 17.29	$ 18.29	$ 19.29	$ 21.29

4-580-Or

Ironworker **09/01/2026**

JOB DESCRIPTION Ironworker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES
PER HOUR:

	07/01/2026	01/01/2027
Ironworker:		Additional
Structural, Bridges, Machinery	$ 59.45	1.38*

* To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour paid:

Journeyman $ 95.26

OVERTIME PAY
See (B, B1, Q, *V) on OVERTIME PAGE
*NOTE: Benefits are calculated for every hour paid.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES
6 month terms at the following wages per hour:

	1st	2nd	3rd-6th
07/01/2026	$ 30.87	$ 31.47	$ 32.08

Supplemental Benefits

PER HOUR PAID: $ 69.08

4-40/361-Str

Ironworker **09/01/2026**

JOB DESCRIPTION Ironworker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES
Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour:	07/01/2026
Reinforcing & Metal Lathing:	$ 58.85

SUPPLEMENTAL BENEFITS

Per hour:	
Reinforcing & Metal Lathing	$ 46.42

OVERTIME PAY
See (B, E, Q, *X) on OVERTIME PAGE
Wages Per Hour:

At Time & One Half	$ 87.35
At Double Time	115.85

Supplemental Benefit Premiums for Overtime Hours worked:

At Time & One Half	$ 52.77
At Double Time	59.27

*Only $24.00 per hour for non worked hours

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 11, 13, 20, 21, 22, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1) year terms at the following Wages Per Hour:

	1st	2nd	3rd	4th
Straight time	$ 22.55	$ 25.00	$ 28.00	$ 30.00
At Time & One Half	33.05	36.60	41.10	44.10
At Double Time	46.65	51.80	57.80	61.80

SUPPLEMENTAL BENEFITS Per Hour:

1st	2nd	3rd	4th
$ 18.17	$ 18.22	$ 17.22	$ 17.22

4-46Reinf

Laborer - Building — 09/01/2026

JOB DESCRIPTION Laborer - Building **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

WAGES

Per hour	07/01/2026
Laborer	$ 46.26
"Base Wage"	$ 46.16**
Laborer/Asbestos & Hazardous Materials Removal	$ 50.35*
"Base Wage"	$ 50.25**

* Abatement/Removal of:
- Lead based or lead containing paint on materials to be repainted is classified as Painter.
- Asbestos containing roofs and roofing material is classified as Roofer.

** Overtime premiums are calculated using Laborer "Base Wage"

NOTE: Upgrade/Material condition work plan for work performed during non-outage under a wage formula of 90% wage/100% fringe benefits at nuclear power plants.

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2026
Journeyworker	$ 34.10

OVERTIME PAY
See (B, E, E2, Q, *V) on OVERTIME PAGE
*Note: For Sundays and Holidays worked benefits are at the same premium as wages.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES
LABORER ONLY
Hourly terms at the following wage:

	Level A	Level B	Level C	Level D
	0-1000	1001-2000	2001-3000	3001-4000
07/01/2026	$ 30.60	$ 35.35	$ 40.05	$ 42.05

Supplemental Benefits per hour:

Apprentices	
All terms	$ 25.95

8-235/B

Laborer - Heavy&Highway **09/01/2026**

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

WAGES
PUTNAM: APPLIES TO ALL HEAVY & HIGHWAY WORK EXCLUDING HIGHWAYS, STREETS, AND BRIDGES

GROUP I: Blaster, Quarry Master, Curbs/Asphalt Screedman, Pipe Jacking and Boring Operations Operator, Qualified Dead Condition Pipe Fuser (B Mechanic)

GROUP II: Burner, Drillers(jumbo, joy, wagon, air track, hydraulic), Drill Operator, Self Contained Rotary Drill, Curbs, Raker, Bar Person, Concrete Finisher.

GROUP III: Pavement Breakers, Jeeper Operator, Jack Hammer, Pneumatic Tools (all), Gas Driller, Guniting, Railroad Spike Puller, Pipelayer, Chain Saw, Deck winches on scows, Power Buggy Operator, Power Wheelbarrow Operator, Bar Person Helper, Compressed Airlance, Water Jet Lance.

GROUP IV: Concrete Laborers, Asph. Worker, Rock Scaler, Vibrator Oper., Bit Grinder, Air Tamper, Pumps, Epoxy (adhesives, fillers and troweled on), Barco Rammer, Concrete Grinder, Crack Router Operator, Guide Rail-digging holes and placing concrete and demolition when not to be replaced, distribution of materials and tightening of bolts.

GROUP V: Drillers Helpers, Common Laborer, Mason Tenders, Signal Person, Pit Person, Truck Spotter, Powder Person, Landscape/Nursery Person, Dump Person, Temp. Heat.

GROUP VIA: Asbestos/Toxic Waste Laborer-All removal (Roads, Tunnels, Landfills, etc.) Confined space laborer, Bio-remediation, Phyto-remediation, Lead or Hazardous material, Abatement Laborer.

Wages:(per hour)	07/01/2026
GROUP I	$ 53.95*
GROUP II	52.49*
GROUP III	52.05*
GROUP IV	51.68*
GROUP V	51.30*

GROUP VIA	53.46*
Operator Qualified	
Gas Mechanic(A Mech)	64.76*
Operator Qualified	
Gas Mechanic(1st yr.)	57.95*
Flagperson	44.43*

*NOTE: To calculate overtime premiums, deduct $0.12 from above wages

SHIFT WORK
A shift premium will be paid on Public Work contracts for off-shift or irregular shift work when mandated by the NYS D.O.T. or other Governmental Agency contracts. Employees shall receive an additional 15% per hour above current rate for all off-shift and irregular shift work. Premium pay shall be calculated using the 15% per hour differential as base rate.

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker: $ 30.58

OVERTIME PAY
See (B, E, P, R, S) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
NOTE: For Holiday Overtime: 5, 6 - Code 'S' applies
For Holiday Overtime: 8, 15, 25, 26 - Code 'R' applies

REGISTERED APPRENTICES

1st term	2nd term	3rd term	4th term
1-1000hrs	1001-2000hrs	2001-3000hrs	3001-4000hrs
$ 33.35	$ 38.48	$ 43.61	$ 48.74

Supplemental Benefits per hour:
$ 26.42

8-60H/H

Laborer - Tunnel — 09/01/2026

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 11

ENTIRE COUNTIES
Columbia, Dutchess, Greene, Orange, Otsego, Putnam, Rockland, Sullivan, Ulster, Westchester

PARTIAL COUNTIES
Chenango: Townships of Columbus, Sherburne and New Berlin.
Delaware: Townships of Andes, Bovina, Middletown, Roxbury, Franklin, Hamden, Stamford, Delhi, Kortright, Harpersfield, Merideth and Davenport.

WAGES
Class 1: All support laborers/sandhogs working above the shaft or tunnel.

Class 2: All laborers/sandhogs working in the shaft or tunnel.

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

WAGES: (per hour)

	07/01/2026
Class 1	$ 60.30
Class 2	62.45
Class 4	68.85
Class 5	53.15

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional $ 3.00 an hour.

SUPPLEMENTAL BENEFITS
Per hour:

Benefit 1	$ 39.23
Benefit 2	55.66
Benefit 3	72.08

Benefit 1 applies to straight time hours, paid holidays not worked.
Benefit 2 applies to over 8 hours in a day (M-F) and Saturday hours worked.
Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE
When a recognized Holidays falls on Saturday or Sunday, holidays falling on Saturday shall be recognized or observed on Friday and holidays falling on Sunday shall be recognized or observed on Monday. Employees ordered to work on the Saturday or Sunday of the holiday or on the recognized or the observed Friday or Monday for those holidays falling on Saturday or Sunday shall receive double time the established rate and benefits for the holiday.

REGISTERED APPRENTICES
FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and location where the work is to be performed.

11-17/60/235/754Tun

Lineman Electrician — 09/01/2026

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Westchester

WAGES
A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

Crane Operators: Operation of any type of crane on line projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on line projects.
Digging Machine Operator: All other digging equipment and augering on line projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator equipment/operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

-----Below rates applicable on all electrical overhead and underground distribution and maintenance work and overhead and underground transmission line work, electrical substations, switching structures, continuous pipe-type underground fluid or gas filled transmission conduit and cable installations, maintenance jobs or projects, railroad catenary installations and maintenance, third rail installations, the bonding of rails and the installation of fiber optic cable. Includes access matting for line work.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Tech, Welder	$ 67.64	$ 70.24	$ 73.01
Crane, Crawler Backhoe	67.64	70.24	73.01
Cable Splicer-Pipe Type	74.40	77.26	80.31
Cert. Welder-Pipe Type	71.02	73.75	76.66
Group B:			
Digging Mach Operator	$ 60.88	$ 63.22	$ 65.71
Group C:			
Tractor Trailer Driver	$ 57.49	$ 59.70	$ 62.06
Groundman, Truck Driver	54.11	56.19	58.41
Equipment Mechanic	54.11	56.19	58.41
Group D:			
Flagger	$ 37.20	$ 38.63	$ 40.16

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 3, 2027.

SHIFT WORK

The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*
Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid	See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime	See (5, 6, 8, 15, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249aWest

Lineman Electrician - Teledata — 09/01/2026

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to LL 224-E,solicited prior to July 1, 2025. For all projects, excluding dial-up internet access service, solicited on or after July 1, 2025, please see BROADBAND

Per hour:	07/01/2026	01/04/2027	01/03/2028	01/01/2029
Cable Splicer	$ 42.03	$ 43.30	$ 44.59	$ 45.93
Installer, Repairman	39.89	41.09	42.32	43.59
Teledata Lineman	39.89	41.09	42.32	43.59
Tech., Equip. Operator	39.89	41.09	42.32	43.59
Groundman/Flagger	21.14	21.78	22.43	23.10

For outside work, stopping at first point of attachment (demarcation).

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work, please see LINEMAN.

SHIFT WORK
The following rates apply when the contracting agency mandates multiple shifts of at least five (5) days duration are worked. When two (2) or three (3) shifts are worked the following rates apply:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 6.18 plus 4%*	$ 6.43 plus 5%*	$ 6.43 plus 6%*	$ 6.68 plus 7%*

*NOTE: The percentage (%) listed above is based on the hourly wage paid, straight time rate or premium time rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting — 09/01/2026

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES
Westchester

WAGES
Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

Crane Operators: Operation of any type of crane on Traffic Signal/Lighting projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on Traffic Signal/Lighting projects.
Digging Machine Operator: All other digging equipment and augering on Traffic Signal/Lighting projects.

A Groundman/Groundman Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Technician	$ 61.18	$ 63.52	$ 66.01
Crane, Crawler Backhoe	61.18	63.52	66.01
Certified Welder	64.24	66.70	69.31
Group B:			
Digging Machine	$ 55.06	$ 57.17	$ 59.41
Group C:			
Tractor Trailer Driver	$ 52.00	$ 53.99	$ 56.11
Groundman, Truck Driver	48.94	50.82	52.81
Equipment Mechanic	48.94	50.82	52.81
Group D:			

Flagger	$ 36.71	$ 38.11	$ 39.61

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

SHIFT WORK
The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*
Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249aWestLT

Mason - Building — 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

PARTIAL COUNTIES
Orange: Only the Township of Tuxedo.

WAGES
Per hour:

	07/01/2026
Bricklayer	$ 50.15
Cement Mason	50.15
Plasterer/Stone Mason	50.15
Pointer/Caulker	50.15

Additional $1.00 per hour for power saw work
Additional $0.50 per hour for swing scaffold or staging work

SHIFT WORK
SHIFT WORK: When shift work or an irregular workday is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:
Irregular workday requires 15% premium
Second shift an additional 15% of wage plus benefits to be paid
Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 40.15

OVERTIME PAY
OVERTIME:
Cement Mason See (B, E, Q, W) on OVERTIME PAGE.
All Others See (B, E, E2, Q) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following percentage of Journeyworker's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of Journeyworker supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

11-5wp-b

Mason - Building — 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES
Building

Wages per hour:	07/01/2026	01/01/2027 Additional
Mosaic & Terrazzo Mechanic	$ 62.82	$ 1.06
Mosaic & Terrazzo Finisher	61.22	

SUPPLEMENTAL BENEFITS
Per hour:

Mosaic & Terrazzo Mechanic	$ 31.91* + $11.63
Mosaic & Terrazzo Finisher	$ 31.91* + 11.61

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY
See (A, E, Q) on OVERTIME PAGE
Deduct $7.00 from hourly wages before calculating overtime.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Easter Sunday is an observed holiday.Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

REGISTERED APPRENTICES

Wages Per hour:

	1st 0-1500	2nd 1501-3000	3rd 3001-3750	4th 3751-4500	5th 4501-5250	6th 5251-6000
07/01/2026	$25.90	$33.30	$40.85	$42.00	$50.56	$57.05

Supplemental Benefits per hour:

07/01/2026	$7.26* + 4.07	$9.33* + 5.23	$15.99* + 6.98	$24.31* + 8.14	$25.21* + 9.32	$28.21* + 10.46

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/3

Mason - Building — 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2026	12/07/2026 Additional	06/07/2027 Additional
Tile Setters	$ 66.35	$ 1.28	$ 1.41

SUPPLEMENTAL BENEFITS

Per Hour:

$ 30.56*
+8.56

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE
Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

750 hour terms at the following wage rate:

	1st 1-750	2nd 751-1500	3rd 1501-2250	4th 2251-3000	5th 3001-3750	6th 3751-4500	7th 4501-5250	8th 5251-6000	9th 6001-6750	10th 6501-7000
07/01/2026	$23.09	$28.32	$35.65	$40.86	$44.67	$48.38	$52.23	$57.45	$59.83	$66.35

Supplemental Benefits per hour:

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
07/01/2026	$13.05* + $.77	$13.05* + $.82	$16.16* + $.93	$16.16* + $.98	$17.16* +$1.45	$18.66* +$1.51	$19.66* +$1.94	$19.66* +$1.99	$19.96* +$4.59	$30.56* +$8.56

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52

Mason - Building **09/01/2026**

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2026	01/04/2027 Additional
Building-Marble Restoration:		
Marble, Stone & Terrazzo Polisher	$ 48.72	$ 0.57

SUPPLEMENTAL BENEFITS

Per Hour:	
Journeyworker	
Building-Marble Restoration:	
Marble, Stone & Polisher	$ 32.78

OVERTIME PAY
See (B, *E, Q, V) on OVERTIME PAGE
* On Saturdays, 8th hour and successive hours paid at double hourly rate.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES per hour:

900 hour term at the following wage:

	1st 1-900	2nd 901-1800	3rd 1801-2700	4th 2701
07/01/2026	$ 34.10	$ 38.97	$ 43.84	$ 48.72
Supplemental Benefits Per Hour:				
07/01/2026	$ 31.28	$ 31.78	$ 32.29	$ 32.78

9-7/24-MP

Mason - Building **09/01/2026**

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES
Per Hour:

	07/01/2026	01/04/2027 Additional
Marble Cutters & Setters	$ 65.61	$ 0.75

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker	$ 41.38

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wage Per Hour:

750 hour terms at the following wage

1st	2nd	3rd	4th	5th	6th	7th	8th

	0-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6751-7500	7500+
07/01/2026	$28.35	$42.51	$46.05	$49.59	$53.14	$55.76	$65.61	$65.61

Supplemental Benefits per hour:

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2026	$27.95	$30.68	$31.37	$32.05	$32.73	$39.34	$41.38	$41.38

9-7/4

Mason - Building — 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2026	12/07/2026 Additional	06/07/2027 Additional
Tile Finisher	$ 50.93	$ 1.05*	$ 1.15*

*To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per Hour:
$ 27.16*
+ $8.37

* This portion of benefits is subject to same premium rate as shown for overtime wages.

OVERTIME PAY
See (A, *E, Q) on OVERTIME PAGE
*Double time rate after 10 hours on Saturdays

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88-tf

Mason - Building — 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2026	01/04/2027 Additional
Marble, Stone, Maintenance Finishers:	$ 28.56	$ 0.41

Note 1: An additional $2.00 per hour for time spent grinding floor using "60 grit" and below.
Note 2: Flaming equipment operator shall be paid an additional $25.00 per day.

SUPPLEMENTAL BENEFITS
Per Hour:

Marble, Stone
Maintenance Finishers: $ 16.54

OVERTIME PAY
See (B, *E, Q, V) on OVERTIME PAGE

*Double hourly rate after 8 hours on Saturday

HOLIDAY
Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE
1st term apprentice gets paid for all observed holidays.

REGISTERED APPRENTICES
WAGES per hour:

	07/01/2026
0-750	$ 23.78
751-1500	24.43
1501-2250	25.07
2251-3000	25.70
3001-3750	26.65
3751-4500	27.93
4501+	28.56

Supplemental Benefits:
Per hour:

0-750	$ 12.61
751-1500	13.12
1501-2250	13.65
2251-3000	14.18
3001-3750	14.97
3751-4500	16.01
4501+	16.54

9-7/24M-MF

Mason - Building / Heavy&Highway — 09/01/2026

JOB DESCRIPTION Mason - Building / Heavy&Highway **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES
Per hour:

	07/01/2026	01/04/2027 Additional
Marble-Finisher	$ 51.04	$ 0.53

SUPPLEMENTAL BENEFITS
Journeyworker:
Per hour

Marble- Finisher	$ 38.46

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE
Work beyond 8 hours on a Saturday shall be paid at double the rate.

HOLIDAY
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Heavy&Highway — 09/01/2026

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

PARTIAL COUNTIES
Orange: Only the Township of Tuxedo.

WAGES
Per hour:

	07/01/2026
Bricklayer	$ 50.65
Cement Mason	50.65
Marble/Stone Mason	50.65

Plasterer	50.65
Pointer/Caulker	50.65

Additional $1.00 per hour for power saw work
Additional $0.50 per hour for swing scaffold or staging work

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 40.15

OVERTIME PAY

Cement Mason	See (B, E, Q, W)
All Others	See (B, E, Q,)

HOLIDAY

Paid:	See (5, 6, 16, 25) on HOLIDAY PAGE
Overtime:	See (5, 6, 16, 25) on HOLIDAY PAGE

- Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.
- Supplemental Benefits are not paid for paid Holiday
- If Holiday is worked, Supplemental Benefits are paid for hours worked.
- Whenever an Employee works within three (3) calendar days before a holiday, the Employee shall be paid for the Holiday.

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following percentage of Journeyworker's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of Journeyworker's supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

11-5WP-H/H

Operating Engineer - Building — 09/01/2026

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, New York, Putnam, Queens, Richmond, Westchester

PARTIAL COUNTIES
Dutchess: that part of Dutchess County lying south of the North City Line of the City of Poughkeepsie.

WAGES
NOTE: Construction surveying
Party Chief--One who directs a survey party
Instrument Man--One who runs the instrument and assists Party Chief.
Rodman--One who holds the rod and assists the Survey Crew

Wages:(Per Hour) 07/01/2026

Building Construction:

Party Chief	$ 81.94
Instrument Man	60.49
Rodman	40.63

Steel Erection:

Party Chief	$ 84.04
Instrument Man	63.19
Rodman	43.31

Heavy Construction-NYC counties only:
(Foundation, Excavation.)

Party Chief	$ 88.97
Instrument man	66.04
Rodman	55.85

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2026
Building Construction	$ 29.45* + 7.65
Steel Erection	31.25* + 7.65
Heavy Construction	32.06* + 7.64

* This portion subject to SAME premium as wages

Non-Worked Holiday Supplemental Benefit:
$ 22.48

OVERTIME PAY
See (A, B, E, Q) on OVERTIME PAGE
Code "A" applies to Building Construction and is subject to double the rate after 7 hours on Saturdays.
Code "B" applies to Heavy Construction and Steel Erection and is subject to double the rate after 8 hours on Saturdays.

HOLIDAY
Paid: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

9-15Db

Operating Engineer - Building 09/01/2026

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

PARTIAL COUNTIES
Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES
GROUP I:
Cranes (All Types up to 49 tons), Boom Trucks, Cherry Pickers (All Types), Clamshell Crane, Derrick (Stone and Steel), Dragline, Franki Pile Rig or similar, High Lift (Lull or similar) with crane attachment and winch used for hoisting or lifting, Hydraulic Cranes, Pile Drivers, Potain and similar.

Cranes (All types 50-99 tons), Drill Rig Casa Grande (CAT or similar), Franki Pile Rig or similar, Hydraulic Cranes (All types including Crawler Cranes- No specific boom length).

Cranes (All types 100 tons and over), All Tower Cranes, All Climbing Cranes irrespective of manufacturer and regardless of how the same is rigged, Franki Pile Rig or similar, Conventional Cranes (All types including Crawler Cranes-No specific boom length), Hydraulic Cranes.

GROUP I-A: Barber Green Loader-Euclid Loader, Bulldozer, Carrier-Trailer Horse, Concrete Cleaning Decontamination Machine Operator, Concrete-Portable Hoist, Conway or Similar Mucking Machines, Elevator & Cage, Excavators all types, Front End Loaders, Gradall, Shovel, Backhoe, etc.(Crawler or Truck), Heavy Equipment Robotics Operator/Mechanic, Hoist Engineer-Material, Hoist Portable Mobile Unit, Hoist(Single, Double or Triple Drum), Horizontal Directional Drill Locator, Horizontal Directional Drill Operator and Jersey Spreader, Letourneau or Tournapull(Scrapers over 20 yards Struck), Lift Slab Console, etc., Lull HiLift or Similar, Master Environmental Maintenance Mechanics, Mucking Machines Operator/Mechanic or Similar Type, Overhead Crane, Pavement Breaker(Air Ram), Paver(Concrete), Post Hole Digger, Power House Plant, Road Boring Machine, Road Mix Machine, Ross Carrier and Similar Machines, Rubber tire double end backhoes and similar machines, Scoopmobile Tractor-Shovel Over 1.5 yards, Shovel (Tunnels), Spreader (Asphalt) Telephie(Cableway), Tractor Type Demolition Equipment, Trenching Machines-Vermeer Concrete Saw Trencher and Similar, Ultra High Pressure Waterjet Cutting Tool System, Vacuum Blasting Machine operator/mechanic, Winch Truck A Frame.

GROUP I-B: Compressor (Steel Erection), Mechanic (Outside All Types), Negative Air Machine (Asbestos Removal), Push Button (Buzz Box) Elevator.

GROUP II: Compactor Self-Propelled, Concrete Pump, Crane Operator in Training (Over 100 Tons), Grader, Machines Pulling Sheep's Foot Roller, Roller (4 ton and over), Scrapers (20 yards Struck and Under), Vibratory Rollers, Welder.

GROUP III-A: Asphalt Plant, Concrete Mixing Plants, Forklift (All power sources), Joy Drill or similar, Tractor Drilling Machine, Loader (1 1/2 yards and under), Portable Asphalt Plant, Portable Batch Plant, Portable Crusher, Skid Steer (Bobcat or similar), Stone Crusher, Well Drilling Machine, Well Point System.

GROUP III-B: Compressor Over 125 cu. Feet, Conveyor Belt Machine regardless of size, Compressor Plant, Ladder Hoist, Stud Machine.

GROUP IV-A: Batch Plant, Concrete Breaker, Concrete Spreader, Curb Cutter Machine, Finishing Machine-Concrete, Fine Grading Machine, Hepa Vac Clean Air Machine, Material Hopper(sand, stone, cement), Mulching Grass Spreader, Pump Gypsum etc, Pump-Plaster-Grout-Fireproofing. Roller(Under 4 Ton),Spreading and Fine Grading Machine, Steel Cutting Machine, Siphon Pump, Tar Joint Machine, Television Cameras for Water, Sewer, Gas etc. Turbo Jet Burner or Similar Equipment, Vibrator (1 to 5).

GROUP IV-B: Compressor (all types), Heater (All Types), Fire Watchman, Lighting Unit (Portable & Generator) Pump, Pump Station(Water, Sewer, Portable, Temporary), Welding Machine (Steel Erection & Excavation).

GROUP V: Mechanics Helper, Motorized Roller (walk behind), Stock Attendant, Welder's Helper, Maintenance Engineer Crane(75 ton and over).

Group VI-A: Welder Certified
GROUP VI-B: Utility Man, Warehouse Man.

WAGES: (per hour)

	07/01/2026	03/01/2027
GROUP I		
Cranes- up to 49 tons	$ 71.19	$ 73.11
Cranes- 50 tons to 99 tons	73.69	75.69
Cranes- 100 tons and over	84.27	86.64
GROUP I-A	62.20	63.80
GROUP I-B	57.24	58.67
GROUP II	59.98	61.50
GROUP III-A	57.75	59.20
GROUP III-B	54.93	56.28
GROUP IV-A	57.16	58.58
GROUP IV-B	48.17	49.28
GROUP V	52.01	53.25
Group VI-A	61.05	62.61
GROUP VI-B		
Utility Man	49.30	50.45
Warehouse Man	51.72	52.95

An additional 20% of wage to be paid when required to wear protective equipment on hazardous/toxic waste projects.
Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional $2.00 per hour.
Engineers operating cranes with booms 149 feet or over in length will be paid an additional $3.00 per hour.
Loader operators over 5 cubic yard capacity additional .50 per hour.
Shovel operators over 4 cubic yard capacity additional $1.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 34.42	$ 36.17

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26, 28) on HOLIDAY PAGE

8-137B

Operating Engineer - Heavy&Highway — 09/01/2026

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

PARTIAL COUNTIES
Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES
GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane, (Crawler, Truck),
Dragline, Drill Rig (Casa Grande, Cat, or Similar), Floating Crane (Crane on Barges) under 100 tons, Gin Pole, Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger (Truck or Truck Mounted), Boat Captain, Bulldozer-All Sizes, Central Mix Plant Operator, Chipper (all types), Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader (Motor Grader), Elevator & Cage (Materials or Passenger), Excavator (and all attachments), Front End Loaders (1 1/2 yards and over), High Lift Lull and similar, Hoist (Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer (Material), Jack and Bore Machine, Log Skidders, Mill Machines, Mucking Machines, Overhead Crane, Paver (concrete), Post Pounder (of any type), Push Cats, Road Reclaimer, Robot Hammer (Brokk or similar), Robotic Equipment (Scope of Engineer Schedule), Ross Carrier and similar, Scrapers (20 yard struck and over), Side Boom, Slip Form Machine, Spreader (Asphalt), Trenching Machines (Telephies-Vermeer Concrete Saw), Tractor Type Demolition Equipment, Vacuum Truck. Vibratory Roller(Riding) or Roller used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver (Asphalt).

GROUP II-A: Ballast Regulators, Compactor Self Propelled, Fusion Machine, Rail Anchor Machines, Roller (4 ton and over), Scrapers (20 yard struck and under).

GROUP II-B: Mechanic (Outside) All Types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler (High Pressure), Concrete Breaker (Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift (all types), Gas Tapping (Live), Hydroseeder, Loader (1 1/2 yards and under), Locomotive (all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher (Apprentice), Powerhouse Plant, Roller (under 4 ton), Sheer Excavator, Skid Steer/Bobcat, Stone Crusher, Sweeper (with seat), Well Drilling Machine.

GROUP IV: Service Person (Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine (Truck Mounted), Heater (all types), Lighting Unit (Portable), Maintenance Engineer (For Crane Only), Mechanics Helper, Pump (Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck (Sewer Jet or Similar), Welders Helper, Welding Machine (Steel Erection), Well Point System.

GROUP V: All Tower Cranes-All Climbing Cranes and all cranes of 100-ton capacity or greater (3900 Manitowac or similar) irrespective of manufacturer and regardless of how the same is rigged, Hoist Engineer (Steel), Engineer-Pile Driver, Jersey Spreader, Pavement Breaker/Post Hole Digger.

WAGES: Per hour:	07/01/2026	03/01/2027
Group I	$ 72.77	$ 75.10
Group I-A	63.97	65.99
Group I-B	67.49	69.64
Group II-A	61.21	63.14
Group II-B	63.17	65.17
Group III	60.12	62.01
Group IV	54.49	56.18
Group IV-B	46.59	48.01
Group V		
Engineer All Tower, Climbing and Cranes of 100 Tons	82.61	85.29
Hoist Engineer(Steel)	74.67	77.07
Engineer(Pile Driver)	79.73	82.31
Jersey Spreader, Pavement Breaker (Air Ram)Post Hole Digger	62.66	64.64

Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional $2.00 per hour over the rate listed in the Wage Schedule. Engineers operating cranes with booms 149 feet or over in length will be paid an additional $3.00 per hour over the rate listed in the Wage Schedule. Loader and Excavator Operators: over 5 cubic yards capacity $0.50 per hour over the rate listed in the Wage Schedule. Shovel Operators: over 4 cubic yards capacity $1.00 per hour over the rate listed in the Wage Schedule.

SHIFT WORK

A 15% premium on all hours paid, including overtime hours for 2nd and 3rd shifts on all government mandated off-shift work

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:	$ 38.08 up to 40 Hours	$ 39.68 up to 40 hours
	After 40 hours $ 27.63* PLUS $ 1.45 on all hours worked	After 40 hours $ 28.68* PLUS $ 1.50 on all hours worked

*This amount is subject to premium

OVERTIME PAY
See (B, E, P, *R, **U) on OVERTIME PAGE
* For Holiday codes 8,15,25,26 code R applies
** For Holiday codes 5 & 6 code U applies

HOLIDAY
Paid: See (5, 6, 8, 15, 25, 26, 28) on HOLIDAY PAGE
Overtime See (5, 6, 8, 15, 25, 26) on OVERTIME PAGE

* For Holiday codes 8,15,25,26 code R applies
** For Holiday codes 5 & 6 code U applies

Note: If employees are required to work on Easter Sunday they shall be paid at the rate of triple time.

REGISTERED APPRENTICES
(1)year terms at the following rate.

1st term	$ 38.38	$ 39.59
2nd term	44.78	46.19
3rd term	51.18	52.79
4th term	57.57	59.39

Supplemental Benefits per hour:

	$ 29.08	$ 30.18

8-137HH

Operating Engineer - Heavy&Highway — 09/01/2026

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 9

ENTIRE COUNTIES
Putnam, Westchester

PARTIAL COUNTIES
Dutchess: South of the North city line of Poughkeepsie

WAGES
Party Chief - One who directs a survey party
Instrument Man - One who runs the instrument and assists Party Chief
Rodman - One who holds the rod and in general, assists the Survey Crew
Categories cover GPS & Underground Surveying

Per Hour:	07/01/2026
Party Chief	$ 85.77
Instrument Man	63.48
Rodman	53.53

SUPPLEMENTAL BENEFITS
Per Hour: 07/01/2026

All Categories
Straight Time: $ 32.06* + $7.64

Premium:
Time & 1/2 $ 48.09* + $7.64

Double Time $ 64.12* + $7.64

*This portion is subject to the SAME premium as wages.

Non-Worked Holiday Supplemental Benefits:
$ 22.47

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE
* Doubletime paid on all hours in excess of 8 hours on Saturday

HOLIDAY
Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

Operating Engineer - Heavy&Highway - Tunnel 09/01/2026

JOB DESCRIPTION Operating Engineer - Heavy&Highway - Tunnel **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

PARTIAL COUNTIES
Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES
GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane(Crawler, Truck), Dragline, Drill Rig Casa Grande(Cat or Similar), Floating Crane(Crane on Barge-Under 100 Tons), Hoist Engineer(Concrete/Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger(Truck or Truck Mounted), Boat Captain, Bull Dozer-all sizes, Central Mix Plant Operator, Chipper-all types, Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader(Motor Grader), Elevator & Cage(Materials or Passengers), Excavator(and all attachments), Front End Loaders(1 1/2 yards and over), High Lift Lull, Hoist(Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer(Material), Jack and Bore Machine, Log Skidder, Milling Machine, Moveable Concrete Barrier Transfer & Transport Vehicle, Mucking Machines. Overhead Crane, Paver(Concrete), Post Pounder of any type, Push Cats, Road Reclaimer, Robot Hammer(Brokk or similar), Robotic Equipment(Scope of Engineer Schedule), Ross Carrier and similar machines, Scrapers(20 yards struck and over), Side Boom, Slip Form Machine, Spreader(Asphalt), Trenching Machines, Telephies-Vermeer Concrete Saw, Tractor type demolition equipment, Vacuum Truck, Vibratory Roller (Riding) used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver(Asphalt).

GROUP II-A: Ballast Regulators, Compactor(Self-propelled), Fusion Machine, Rail Anchor Machines, Roller(4 ton and over), Scrapers(20 yard struck and under).

GROUP II-B: Mechanic(outside)all types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler(High Pressure), Concrete Breaker(Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift(all types of power), Gas Tapping(Live), Hydroseeder, Loader(1 1/2 yards and under), Locomotive(all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher(Apprentice), Powerhouse Plant, Roller(under 4 ton), Sheer Excavator, Skidsteer/Bobcat, Stone Crusher, Sweeper(with seat), Well Drilling Machine.

GROUP IV-A: Service Person(Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine(Truck Mounted), Heater(all types), Lighting Unit(Portable), Maintenance Engineer(for Crane only), Mechanics Helper, Pump(Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck(Sewer Jet or similar), Welding Machine(Steel Erection), Welders Helper.

GROUP V-A: Engineer(all Tower Cranes, all Climbing Cranes & all Cranes of 100 ton capacity or greater),Hoist Engineer(Steel-Sub Structure), Engineer-Pile Driver, Jersey-Spreader, Pavement breaker, Post Hole Digger

WAGES: (per hour)

	07/01/2026	03/01/2027
GROUP I	$ 72.77	$ 75.10
GROUP I-A	63.97	65.99
GROUP I-B	67.49	69.64
GROUP II-A	61.21	63.14
GROUP II-B	63.17	65.17
GROUP III	60.12	62.01
GROUP IV-A	54.49	56.18
GROUP IV-B	46.59	48.01

GROUP V-A		
Engineer-Cranes	82.61	85.29
Engineer-Pile Driver	79.73	82.31
Hoist Engineer	74.67	77.07
Jersey Spreader/Post Hole Digger	62.66	64.64

An additional 20% of wage to be paid when required to wear protective equipment on hazardous/toxic waste projects.
Operators required to use two buckets pouring concrete on other than road pavement shall receive $0.50 per hour over scale.
Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional $2.00 per hour.
Engineers operating cranes with booms 149 feet or over in length will be paid an additional $3.00 per hour.
Operators of shovels with a capacity over (4) cubic yards shall be paid an additional $1.00 per hour.
Operators of loaders with a capacity over (5) cubic yards shall be paid an additional $0.50 per hour.

SHIFT WORK
A 15% premium on all hours paid, including overtime hours for 2nd and 3rd shifts
on all government mandated off-shift work

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker:

$ 38.08 up to 40 hours	$ 39.68 up to 40 hours
After 40 hours: $27.63 plus $1.45 on all hours worked	After 40 hours: $28.68 plus $1.50 on all hours worked

OVERTIME PAY
See (E, P, *R, **T, ***U) on OVERTIME PAGE
*For Holiday codes 8, 15, 25, 26, code R applies.
**For Holiday code 28, code T applies.
***For Holiday codes 5 & 6, code U applies.

HOLIDAY
Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
For Holiday codes 5 & 6, code U applies.
For Holiday codes 8, 15, 25, 26, code R applies.
If employees are required to work on Easter Sunday, they shall be paid at the rate of triple time.

REGISTERED APPRENTICES
(1)year terms at the following rates:

1st term	$ 38.38	$ 39.59
2nd term	44.78	46.19
3rd term	51.18	52.79
4th term	57.57	59.39
Supplemental Benefits per hour:		
All terms	$ 29.08	$ 30.18

8-137Tun

Operating Engineer - Marine Dredging — 09/01/2026

JOB DESCRIPTION Operating Engineer - Marine Dredging **DISTRICT** 4

ENTIRE COUNTIES
Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES
These wage rates do not apply to Operating Engineers on land-based construction projects. For those projects, refer to the Operating Engineers Heavy/Highway rates. The wage rates listed below apply specifically to all equipment and operators involved in marine dredging work within navigable waters located in the counties listed above.

Per Hour:	07/01/2026	10/01/2026

CLASS A1 Deck Captain, Leverman, Mechanical Dredge Operator, Licensed Tug Operator with MOTV	$ 48.48	$ 49.94
CLASS A2 Crane Operator (360 swing)	43.20	44.50
CLASS B Dozer, Front Loader Operator (On Land)	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing), Spider/Spill Barge Operator I/II, Fill Placer, Engineer, Chief Mate, Electrician,Chief Welder,Maintenance Engineer, Licensed Boat, Crew Boat Operator	41.93	43.18
CLASS B2 Certified Welder	39.46	40.65
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	38.38	39.53
CLASS C2 Boat Operator	37.15	38.26
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	30.86	31.79

SUPPLEMENTAL BENEFITS
Per Hour:
THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes:	7% of Hourly Straight time wage + $12.00.	7.5% of Hourly Straight time wage + $12.00.

- Additional $0.63 per hour for Overtime hours

OVERTIME PAY
See (B2, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Survey Crew - Consulting Engineer — 09/01/2026

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES
Dutchess: That part in Duchess County lying South of the North City line of Poughkeepsie.

WAGES
Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: Survey Classifications	07/01/2026
Party Chief	$ 51.16
Instrument Man	42.44
Rodman	36.92

SUPPLEMENTAL BENEFITS
Per Hour:

All Crew Members: $ 24.53

OVERTIME PAY
OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.
*Double-time paid on the 9th hour on Saturday.

HOLIDAY
Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

Painter — 09/01/2026

JOB DESCRIPTION Painter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2026	05/01/2027 Additional
Brush	$ 55.76	$2.77*
Abatement/Removal of lead based or lead containing paint on materials to be repainted.	55.76	
Spray & Scaffold	$ 58.76	
Fire Escape	58.76	
Decorator	58.76	
Paperhanger/Wall Coverer	57.27	

*To be allocated at a later date.

SHIFT WORK
Agency/Government mandated off-shift work to be paid at time and one-half the hourly wage.

SUPPLEMENTAL BENEFITS
Per hour:

Paperhanger	$ 39.86
All others	36.72
Paperhanger Premium	45.26
Premium	41.23**

**Applies only to "All others" category, not paperhanger journeyworker.

OVERTIME PAY
See (A, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
One (1) year terms at the following wage rate.

Per hour:	07/01/2026
Appr 1st term...	$ 21.18
Appr 2nd term...	27.40
Appr 3rd term...	33.30
Appr 4th term...	44.67

Supplemental benefits:
Per Hour:

Appr 1st term...	$ 18.06
Appr 2nd term...	22.14
Appr 3rd term...	25.59

Appr 4th term... 32.55

8-NYDC9-B/S

Painter 09/01/2026

JOB DESCRIPTION Painter **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Suffolk, Westchester

PARTIAL COUNTIES
Nassau: All of Nassau except the areas described below: Atlantic Beach, Ceaderhurst, East Rockaway, Gibson, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on the South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave., Rockville Centre is the boundary line up to Lawson Blvd. turn right going west all the above territory. Starting at Union Turnpike and Lakeville Rd. going north to Northern Blvd. the west side of Lakeville road to Northern blvd. At Northern blvd. going east the district north of Northern blvd. to Port Washington Blvd. West of Port Washington blvd.to St.Francis Hospital then north of first traffic light to Port Washington and Sands Point, Manor HAven, Harbour Acres.

WAGES

Per hour:	07/01/2026	05/01/2027
		Additional
Drywall Taper:	$ 55.76	$ 2.77*
Scaffold:	$ 58.76	

* To be allocated a later date.

SHIFT WORK
Agency/Government mandated off-shift work to be paid at time and one-half hourly wage

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker $ 36.72

OVERTIME PAY
See (A, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages - Per Hour:

1500 hour terms at the following wage rate:

1st term	$ 21.18
2nd term	27.40
3rd term	33.30
4th term	44.67

Supplemental Benefits - Per hour:
One year term (1500 hours) at the following dollar amount.

1st year	$ 18.06
2nd year	22.14
3rd year	25.59
4th year	32.55

8-NYDCT9-DWT

Painter - Bridge & Structural Steel 09/01/2026

JOB DESCRIPTION Painter - Bridge & Structural Steel **DISTRICT** 8

ENTIRE COUNTIES
Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per Hour:
STEEL:

Bridge Painting:	07/01/2026	10/01/2026
	$ 57.00*	Additional
	+ 12.90**	+ 3.64***

ADDITIONAL $7.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

*NOTE: All premium wages are to be calculated on base rate per hour only.

** For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (50 hour cap).

*** To be allocated a later date

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:
Journeyworker:

$ 13.49
+ 31.67*

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage - Per hour:
Apprentices: (1) year terms.

	07/01/2026
1st year	$ 22.80* + 5.64**
2nd year	$ 34.20* + 7.74**
3rd year	$ 45.60* + 10.31**

*NOTE: All premium wages are to be calculated on base rate per hour only.

** For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (50 hour cap).

Supplemental Benefits - Per hour:

1st year	$ 13.74
2nd year	$ 8.09* + 18.99
3rd year	$ 10.79* + 25.34

*Portion not applicable to May 1st to November 15th and Nov 16th to April 30th period mentioned above.

8-DC-9/806/155-BrSS

Painter - Line Striping **09/01/2026**

JOB DESCRIPTION Painter - Line Striping **DISTRICT** 8

ENTIRE COUNTIES
Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per hour:

Painter (Striping-Highway):	07/01/2026	04/01/2027
Striping-Machine Operator*	$ 36.93	$ 38.45
Linerman Thermoplastic	44.44	46.22

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

SHIFT WORK
When directly specified in public agency or authority contract documents there shall be a 30% night shift premium pay differential for all work performed after 9:00pm and before 5:00am.

SUPPLEMENTAL BENEFITS
Per hour paid:
Journeyworker:

Striping Machine Operator:	$ 24.95	$ 25.60
Linerman Thermoplastic:	24.95	25.60

OVERTIME PAY
See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES
One (1) year terms at the following wage rates:

	07/01/2026
1st Term:	$ 21.18
2nd Term:	27.40
3rd Term:	33.30

Supplemental Benefits per hour:

1st term:	$ 18.06
2nd term:	22.14
3rd term:	25.59

8-1456-LS

Painter - Metal Polisher 09/01/2026

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2026
Metal Polisher	$ 41.33
Metal Polisher*	42.43
Metal Polisher**	45.33

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker:
All classifications $ 13.99

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year term at the following wage rates:

	07/01/2026
1st year	$ 20.67
2nd year	22.73
3rd year	24.80
1st year*	$ 21.06
2nd year*	23.17
3rd year*	25.34
1st year**	$ 23.17
2nd year**	25.23
3rd year**	27.30

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 9.19
2nd year	9.19
3rd year	9.19

8-8A/28A-MP

Plumber — 09/01/2026

JOB DESCRIPTION Plumber **DISTRICT** 8

ENTIRE COUNTIES
Putnam, Westchester

WAGES
Per hour:

	07/01/2026
Plumber and Steamfitter	$ 66.83

SHIFT WORK

SHIFT WORK:
When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 46.79

OVERTIME PAY
See (B, E, E2, Q, V) on OVERTIME PAGE
OVERTIME:... See on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1)year terms at the following wages:

1st Term	$ 24.95
2nd Term	28.59
3rd Term	33.07
4th Term	47.01
5th Term	50.42

Supplemental Benefits per hour:

1st term	$ 19.16
2nd term	21.42
3rd term	25.44
4th term	33.77
5th term	35.82

8-21.1-ST

Plumber - HVAC / Service — 09/01/2026

JOB DESCRIPTION Plumber - HVAC / Service **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Putnam, Westchester

PARTIAL COUNTIES
Delaware: Only the townships of Middletown and Roxbury
Ulster: Entire County(including Wallkill and Shawangunk Prisons) except for remainder of Town of Shawangunk and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES
Per hour: 07/01/2026

HVAC Service	$ 45.43
	+ $ 4.52*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker HVAC Service
$ 33.34

OVERTIME PAY
See (B, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
HVAC SERVICE
(1)year terms at the following wages:

1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
$ 20.56	$ 24.42	$ 30.35	$ 37.33	$ 40.63
+$2.45*	+$2.79*	+$3.34*	+$4.00*	+$4.26*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental Benefits per hour:

Apprentices 07/01/2026

1st term	$ 22.81
2nd term	24.68
3rd term	26.69
4th term	29.49
5th term	31.46

8-21.1&2-SF/Re/AC

Plumber - Jobbing & Alterations — 09/01/2026

JOB DESCRIPTION Plumber - Jobbing & Alterations **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Putnam, Westchester

PARTIAL COUNTIES
Ulster: Entire county (including Wallkill and Shawangunk Prisons in Town of Shawangunk) EXCEPT for remainder of Town of Shawangunk, and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour:	07/01/2026
Journeyworker:	$ 52.14

Repairs, replacements and alteration work is any repair or replacement of a present plumbing system that does not change existing roughing or water supply lines.

SHIFT WORK
When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker
$ 38.99

OVERTIME PAY
See (B, *E, E2, Q, V) on OVERTIME PAGE
*When used as a make-up day, hours after 8 on Saturday shall be paid at time and one half.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1) year terms at the following wages:

1st year	$ 22.32
2nd year	24.83
3rd year	27.16
4th year	38.07
5th year	40.25

Supplemental Benefits per hour:

1st year	$ 13.07
2nd year	15.31
3rd year	19.67
4th year	26.65
5th year	28.88

8-21.3-J&A

Roofer 09/01/2026

JOB DESCRIPTION Roofer **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2026	05/01/2027 Additional
Roofer/Waterproofer	$ 52.50 + $7.00*	+ $ 3.00

* This portion is not subjected to overtime premiums.

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS
Per Hour: $ 33.12

OVERTIME PAY
See (B, H) on OVERTIME PAGE

Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1) year term apprentices indentured prior to 01/01/2023

1st	2nd	3rd	4th
$ 18.38	$ 26.25	$ 31.50	$ 39.38
	+ 3.50*	+ 4.20*	+ 5.26*

Supplemental Benefits:

1st	2nd	3rd	4th
$ 4.32	$ 16.94	$ 20.17	$ 25.03

* This portion is not subjected to overtime premiums.

(1) year term apprentices indentured after 01/01/2023

1st	2nd	3rd	4th	5th
$ 19.95	$ 23.63	$ 26.25	$ 31.50	$ 39.38
	+ 3.16*	+ 3.50*	+ 4.20*	+ 5.26*

Supplemental Benefits:

1st	2nd	3rd	4th	5th
$ 8.15	$ 15.32	$ 16.94	$ 20.17	$ 25.03

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker — 09/01/2026

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

	07/01/2026
SheetMetal Worker	$ 53.48
	+ 3.81*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

SHIFT WORK
For all NYS D.O.T. and other Governmental mandated off-shift work:
12% increase for additional shifts for a minimum of five (5) days

SUPPLEMENTAL BENEFITS
Journeyworker $ 48.71

OVERTIME PAY
See (B, E, Q,) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 23) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 21.80	$ 22.61	$ 25.12	$ 27.61	$ 30.13	$ 32.67	$ 35.65	$ 38.61
+ 1.52*	+ 1.71*	+ 1.91*	+ 2.10*	+ 2.29*	+ 2.48*	+ 2.67*	+ 2.86*

*This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

Supplemental Benefits per hour:

Apprentices	
1st term	$ 19.09
2nd term	23.39
3rd term	25.99
4th term	28.59
5th term	31.18
6th term	33.76

7th term	35.89
8th term	38.04

8-38

Sheetmetal Worker — 09/01/2026

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per Hour:

	07/01/2026	08/01/2026
Sign Erector	$ 62.00	$ 64.00

NOTE: For Structurally Supported Overhead Highway Signs (See STRUCTURAL IRON WORKER CLASSIFICATION)

SUPPLEMENTAL BENEFITS
Per Hour:

Sign Erector	$ 59.58	$ 60.62

OVERTIME PAY
See (B, F, S) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Per Hour:
6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

SUPPLEMENTAL BENEFITS Per Hour:

07/01/2026

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 19.04	$ 21.62	$ 24.21	$ 26.79	$36.17	$ 39.36	$ 43.50	$ 46.77	$ 50.05	$ 53.32

08/01/2026

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 19.45	$ 22.09	$ 24.72	$ 27.36	$36.81	$ 40.07	$ 44.29	$ 47.62	$ 50.95	$ 54.29

4-137-SE

Sprinkler Fitter — 09/01/2026

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES
Per hour

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
Sprinkler Fitter	$ 60.78	$ 60.78	$ 64.37	$ 64.37

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 32.66	$ 33.66	$ 33.66	$ 34.66

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES

One Half Year terms at the following wage per hour:

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
1st Term	$ 30.87	$ 30.87	$ 32.42	$ 32.42
2nd Term	34.46	34.46	36.19	36.19
3rd Term	37.34	37.34	39.20	39.20
4th Term	40.21	40.21	42.22	42.22
5th Term	42.36	42.36	44.48	44.48
6th Term	45.95	45.95	48.25	48.25
7th Term	48.82	48.82	51.27	51.27
8th Term	51.70	51.70	54.28	54.28
9th Term	54.57	54.57	57.30	57.30
10th Term	57.44	57.44	60.31	60.31
Supplemental Benefits per hour:				
1st & 2nd Term	$ 10.23	$ 11.23	$ 11.23	$ 12.23
3rd & 4th Term	22.79	23.79	23.79	24.79
All Other Terms	23.04	24.04	24.04	25.04

1-669.2

Teamster - Building / Heavy&Highway — 09/01/2026

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

GROUP A: Straight Trucks (6-wheeler and 10-wheeler), A-frame, Winch, Dynamite Seeding, Mulching, Agitator, Water, Attenuator, Light Towers, Cement (all types), Suburban, Station Wagons, Cars, Pick Ups, any vehicle carrying materials of any kind.
GROUP AA: Tack Coat
GROUP B: Tractor & Trailers (all types).
GROUP BB: Tri-Axle,14 Wheeler
GROUP C: Low Boy (carrying equipment).
GROUP D: Fuel Trucks, Tire Trucks.
GROUP DD: Tow Truck/Flatbed Single axle.
GROUP E: Off-road Equipment (over 40 tons): Athey Wagons, Belly Dumps, Articulated Dumps, Trailer Wagons.
GROUP F: Off-road Equipment (over 40 tons) Euclid, DJB.
GROUP G: Off-road Equipment (under 40 tons) Athey Wagons, Belly Articulated Dumps, Trailer Wagons, Tracker/Crawler Dump Truck.
GROUP H: Off-road Equipment(under 40 tons), Euclid.
GROUP HH: Off-road Equipment(under 40 tons) D.J.B.
GROUP I: Off-road Equipment(under 40 tons) Darts.
GROUP II: Off-road Equipment(under 40 tons) RXS.

WAGES:(per hour)

	07/01/2026
GROUP A	$ 49.61*
GROUP AA	52.61*
GROUP B	50.23*
GROUP BB	49.73*
GROUP C	52.36*
GROUP D	50.06*
GROUP DD	38.74*
GROUP E	50.61*
GROUP F	51.61*
GROUP G	50.36*
GROUP H	50.98*
GROUP HH	51.36*
GROUP I	51.11*
GROUP II	51.48*

* To calculate premium wage, subtract $ .10 from the hourly wage.

Note: Fuel truck operators on construction sites addit. $5.00 per day.

For work on hazardous/toxic waste site addit. 20% of hourly rate.

Note: For aggregate and asphalt delivery, the applicable prevailing rate is based on the type of vehicle operated.

SHIFT WORK
When mandated by the contracting agency, DOT, or any governmental agency contracts shall receive a shift differential of fifteen (15%) above the wage rate for all work performed during the irregular shift.

SUPPLEMENTAL BENEFITS
Per hour:
Journeyworker

First 40 hours	$ 40.83
Over 40 hours	31.64

OVERTIME PAY
See (B, E, P, *R, **T) on OVERTIME PAGE
*For code (8,15,25,26) code R applies
**For code (5,6) code T applies

HOLIDAY
Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

8-456

Welder 09/01/2026

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2026

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(B3)	Time and one half of the hourly rate after 40 straight hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays

(S)	Two and one half times the hourly rate for Holidays
(S1)	Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
(T)	Triple the hourly rate for Holidays
(U)	Four times the hourly rate for Holidays
(V)	Including benefits at SAME PREMIUM as shown for overtime
(W)	Time and one half for benefits on all overtime hours.
(X)	Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth

New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12226

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By: (Check Only One) ☐ Contracting Agency ☐ Architect or Engineering Firm ☐ Public Work District Office Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone Fax

E-Mail:

2. NY State Units (see Item 5).

- ☐ 01 DOT
- ☐ 02 OGS
- ☐ 03 Dormitory Authority
- ☐ 04 State University Construction Fund
- ☐ 05 Mental Hygiene Facilities Corp.
- ☐ 06 OTHER N.Y. STATE UNIT
- ☐ 07 City
- ☐ 08 Local School District
- ☐ 09 Special Local District, i.e., Fire, Sewer, Water District
- ☐ 1O Village
- ☐ 11 Town
- ☐ 12 County
- ☐ 13 Other Non-N.Y. State (Describe)

3. SEND REPLY TO ☐ (check if new or change)
Name and complete address:

Telephone Fax

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

☐ New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

- ☐ 1. New Building
- ☐ 2. Addition to Existing Structure
- ☐ 3. Heavy and Highway Construction (New and Repair)
- ☐ 4. New Sewer or Waterline
- ☐ 5. Other New Construction (Explain)
- ☐ 6. Other Reconstruction, Maintenance, Repair or Alteration
- ☐ 7. Demolition
- ☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- ☐ Construction (Building, Heavy Highway/Sewer/Water)
- ☐ Tunnel
- ☐ Residential
- ☐ Landscape Maintenance
- ☐ Elevator maintenance
- ☐ Exterminators, Fumigators
- ☐ Fire Safety Director, NYC Only
- ☐ Fuel Delivery
- ☐ Guards, Watchmen
- ☐ Janitors, Porters, Cleaners, Elevator Operators
- ☐ Moving furniture and equipment
- ☐ Trash and refuse removal
- ☐ Window cleaners
- ☐ Other (Describe)

9. Does this project comply with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature

SEE PAGE TWO FOR LAWS RELATING TO PUBLIC WORK CONTRACTS

NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED ANY PUBLIC WORK CONTRACT

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: https://apps.labor.ny.gov/EDList/searchPage.do

For inquiries please call 518-457-5589.

NYSDOL Bureau of Public Work Debarment List 09/11/2026

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5784	A.J.M. TRUCKING, INC.		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
DOL	DOL		AKHLAQ OULAKH		4307 28TH AVE ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	DOL		ALEXANDER DELISA		411 THEODORE FREMND SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	NYC		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL	*****8387	AMERICAN PAVING & MASONRY, CORP.		8 FOREST AVE GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	DOL	*****8654	AMERICAN PAVING, INC.		8 FORREST AVE. GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	NYC	*****8017	AMIN ELECTRICAL CORP.		97-23 218TH STREET QUEENS VILLAGE NY 11429	12/04/2025	12/04/2030
DOL	DOL		ANGELO STANCO		8 FOREST AVE. GLEN COVE NY 11542	05/24/2024	05/24/2029
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****4231	ANKER'S ELECTRIC SERVICE, INC.		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL		ANTHONY CASALE		20 HEATHER RIDGE ROAD TROY NY 12180	05/20/2025	05/20/2030
DOL	DOL		ANTHONY MONGELLI		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	DOL	*****3932	B ROC CONSTRUCTION INC		7307 WOODSIDE ROAD VICTOR NY 14564	05/06/2025	05/06/2030
DOL	DA	*****2404	BJA RENOVATION, CORP		33 DOLLARD DR NORTH BABYLON NY 11703	03/19/2025	03/19/2030
DOL	DOL	*****5078	BLACK RIVER TREE REMOVAL, LLC		29807 ANDREWS ROAD BLACK RIVER NY 13032	10/17/2023	10/17/2028
DOL	DOL		C.M.C CONTRACTORS, INC.		500 WEST PUTNAM AVE SUITE 400GREENWICH CT 06830	09/03/2025	09/03/2030
DOL	DOL		CARLOS F. ESCOBAR		411 THEODORE FREMD AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL		CARLOS FIGUEROA		411 THEODORE FREMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL	*****4155	CASA BUILDERS, INC.	FRIEDLANDER CONSTRUCTION	64 N PUTT CONNERS ROAD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL		CESAREO TULA		120 SEARS AVE ELMSFORD NY 10523	09/26/2025	09/26/2030
DOL	DOL	*****2292	CHAMPION MAINTENANCE CONTRACTORS, INC.		211 SOUTH RIDGE STREET RYE BROOK NY 10573	09/03/2025	09/03/2030
DOL	NYC	*****2117	CHARAN ELECTRICAL ENTERPRISES		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DOL		CHARLES CASALE		55 MAIN AVENUE WYNANTSKILL NY 12198	05/20/2025	05/20/2030
DOL	DOL		CHARLES CASALE		55 MAIN AVENUE WYNANTSKILL NY 12198	05/20/2025	05/20/2030
DOL	DOL		CHRISTOPHER PEROSI		5507 NESCONSET HIGHWAY MT. SINAI NY 11766	07/17/2025	07/17/2030
DOL	DOL	*****2281	CORRAO TRUCKING, INC.		PO BOX 393 NANUET NY 10954	09/17/2024	09/17/2029
DOL	DOL		CRAIG JOHANSEN		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DANIEL DELISA		211 SOUTH RIDGE STREET RYE BROOK NY 10573	09/03/2025	09/03/2030
DOL	DOL		DANIEL LOHAN		6836 N. LEXINGTON LANE NILES IL 60714	05/28/2026	05/28/2031
DOL	DOL		DANIEL ROBERT MCNALLY		7 GREENFIELD DRIVE WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL		DARWIN PEGUESE		6400 BALTIMORE NATIONAL SUITE 602CANTONSVILLE NY 21228	10/24/2024	10/24/2029
DOL	DOL		DAVID FRIEDLANDER		64 NORTH PUTT CORNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL		DENISE NAGLE		36 OAKWOOD TRAIL S AL MONROE NY 10950	10/29/2025	10/29/2030

NYSDOL Bureau of Public Work Debarment List 09/11/2026

Article 8

DOL	DOL		DINA TAYLOR		64 N PUTT CONNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL	*****2337	EGL DRAINAGE SOLUTION & REPAIRS LLC		5507 NESCONSET HIGHWAY MT. SINAI NY 11766	07/17/2025	07/17/2030
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	DOL		EMIL KISZKO		84 DIAMOND ST BROOKLYN NY 11222	07/18/2024	07/18/2029
DOL	DOL	*****3298	EMJACK CONSTRUCTION CORP.		84 DIAMOND ST BROOKLYN NY 11222	07/18/2024	07/18/2029
DOL	DOL	*****3298	EMJACK CONSTRUCTION LLC		4192 SIR ANDREW CIRCLE DOYLESTOWN PA 18902	07/18/2024	07/18/2029
DOL	NYC		ENRICO MANETTA		101 MALBA DR. WHITESTONE NY 11357	04/01/2026	04/01/2031
DOL	DOL		EUGENIUSZ "GINO" KUCHAR		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DOL	*****2998	G.E.M. AMERICAN CONSTRUCTION CORP.		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	NYC		GHANSHYAM AMIN		97-23 218TH STREET QUEENS VILLAGE NY 11429	12/04/2025	12/04/2030
DOL	DA		GIOVANNA TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA		GIOVANNI NAPOLITANO		2501 BAYVIEW AVENUE WANTAGH NY 11793	02/21/2024	02/21/2029
DOL	DA	*****0213	GORILLA CONTRACTING GROUP, LLC		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DA	*****4760	GTX CONSTRUCTION ASSOCIATES, CORP		2501 BAYVIEW AVE WANTAGH NY 11793	02/21/2024	02/21/2029
DOL	DOL		HENRY WICKE A/K/A HENRY WICKE, JR.		36 OAKWOOD TRAIL S AL MONROE NY 10950	10/29/2025	10/29/2030
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****6961	HUNTER ELEVATOR COMPANY, INC.		36 OAKWOOD TRAIL S AL MONROE NY 10950	10/29/2025	10/29/2030
DOL	DOL	*****2397	ISLAND BREEZE MARINE, INC.		6400 BALTIMORE NATIONAL CANTONSVILLE MD 21228	10/24/2024	10/24/2029
DOL	DOL	*****5010	J. LINDSLEY ENTERPRISE, LLC		1002 STATE ROUTE 176 FULTON NY 13069	07/30/2025	07/30/2030
DOL	DOL	*****0241	J. LINDSLEY ROOFING, LLC		211 NORTH 2ND STREET FULTON NY 13069	07/30/2025	07/30/2030
DOL	DOL		J.M.J CONSTRUCTION		151 OSTRANDER AVENUE SYRACUSE NY 13205	11/21/2022	11/21/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	12/12/2022	12/12/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JAMES LINDSLEY		211 NORTH 2ND STREET FULTON NY 13069	07/30/2025	07/30/2030
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026

DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****2435	JEFFEL D. JOHNSON	JMJ7 AND SON	5553 CAIRNSTRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JEFFEL JOHNSON ELITE CARPENTER REMODEL AND CONSTRUCTION		C2 EVERGREEN CIRCLE LIVERPOOL NY 13090	11/21/2022	11/21/2027
DOL	DOL	*****2435	JEFFREY M. JOHNSON	JMJ7 AND SON	5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JENNIFER LINDSLEY		211 NORTH 2ND STREET FULTON NY 13069	07/30/2025	07/30/2030
DOL	DOL		JERRY DASTON		36 OAKWOOD TRAIL S AL MONROE NY 10950	10/29/2025	10/29/2030
DOL	DOL		JMJ7 & SON CONSTRUCTION, LLC		5553 CAIRNS TRAIL LIVERPOOL NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 AND SONS CONTRACTORS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS		7014 13TH AVENUE BROOKLYN NY 11228	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS AND SONS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS, LLC		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JOHN NAGLE A/K/A JOHN NAGLE, JR.		36 OAKWOOD TRAIL S AL MONROE NY 10950	10/29/2025	10/29/2030
DOL	DOL		JONATHAN DELISA		411 THEODORE FREMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL		JORGE FIGUEROA		411 THEODORE FRMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DA		JOSEPH DEMASCO		33 DOLLARD DRIVE NORTH BABYLON NY 11703	01/30/2026	01/30/2031
DOL	DA		JOSEPH DEMASCO		33 DOLLARD DRIVE NORTH BABYLON NY 11703	03/19/2025	03/19/2030
DOL	DOL		JOSEPH HALL		937 US ROUTE 11 CENTRAL SQUARE NY 13036	10/21/2024	10/21/2029
DOL	DOL	*****2271	JOSEPH HALL COMPANIES LLC		937 US ROUTE 11 CENTRAL SQUARE NY 13036	10/21/2024	10/21/2029
DOL	DOL		JOSEPH K. SALERNO		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL		JOSEPH K. SALERNO II		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JRN CONSTRUCTION CO, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KEAN INDUSTRIES, LLC		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028

DOL	DOL		KEVIN FUNEZ URBINA A/K/A KEVIN FUNEZ		1009 LYNDALE AVE TRENTON NJ 08629	12/16/2024	12/16/2029
DOL	DOL	*****8760	KJ&J CONSTRUCTION, LLC		1009 LYNDALE AVE TRENTON NJ 08629	12/16/2024	12/16/2029
DOL	DOL		KMA GROUP II, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL	*****1833	KMA GROUP INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KMA INSULATION, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KRIN HEINEMANN		2345 ROUTE 52, SUITE 2N HOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	NYC		KULWANT S. DEOL		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****3716	LIGHTNIN ELECTRIC INC.		3418 NORTHERN BLVD SUITE 5-27LONG ISLAND CITY NY 11101	12/13/2024	12/13/2029
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DOL		LIZETTE PONCE		411 THEODORE FREMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	NYC	*****7516	MANCO ENTERPRISES OF NY, INC.		44-17 54TH DR. MASPETH NY 11378	04/01/2026	04/01/2031
DOL	NYC	*****1783	MANETTA ENTERPISES, INC. D/B/A MANETTA INDUSTRIES		44-17 54TH DR. MASPETH NY 11378	04/01/2026	04/01/2031
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		MOHAMMAD MIAN		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	NYC		NASEER CHAUDHRY		2349 BRAGG STREET BROOKLYN NY 11229	04/22/2025	04/22/2030
DOL	DOL	*****7790	NATIONAL BUILDING & RESTORATION CORP		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****1797	NATIONAL CONSTRUCTION SERVICES, INC		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NELCO CONTRACTING, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DA		NICHOLAS BARNETT		33 DOLLARD DR BABYLON NY 11703	03/04/2025	03/04/2030
DOL	DOL		NICHOLAS RAO		411 THEODORE FREMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DA		NICHOLAS T. ANALITIS		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		NIKOLA NTONI		3418 NORTHERN BLVD SUITE 5-27LONG ISLAND CITY NY 11101	12/13/2024	12/13/2029
DOL	NYC	*****6971	NN CONSTRUCTION, INC.		2349 BRAGG STREET BROOKLYN NY 11229	04/22/2025	04/22/2030

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DOL	NYC	*****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL	*****4168	PHANTOM CONSTRUCTION CORP.		95-27 116TH STREET QUEENS NY 11419	07/12/2024	07/12/2029
DOL	DOL	*****4168	PHANTOM CONSTRUCTION CORP.		95-27 116TH STREET QUEENS NY 11419	05/28/2024	05/28/2029
DOL	DOL	*****2041	QUALITY STEEL ERECTORS INC.		6836 N. LEXINGTON LANE NILES IL 60714	05/28/2026	05/28/2031
DOL	DOL	*****4772	R.W. LOBDELL CONSTRUCTION LLC		635 WEST DRYDEN ROAD FREEVILLE NY 13068	01/31/2025	01/31/2030
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		ROSA GARCIA		411 THEODORE FRMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DA	*****0476	SAMCO ELECTRIC CORP.		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA		SILVANO TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL		STEVEN DELISA		411 THEODORE FREMND AVE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL		SYED MUHAMMAD S. JAFRI A/K/A SHARRUKH JAFRI		4307 28TH AVE ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL		TARLOK SINGH		95-27 116TH STREET QUEENS NY 11419	05/28/2024	05/28/2029
DOL	DOL		TARLOK SINGH		95-27 116TH STREET QUEENS NY 11419	07/12/2024	07/12/2029
DOL	DOL	*****4855	TECH INDUSTRIES LLC		20 HEATHER RIDGE ROAD TROY NY 12180	05/20/2025	05/20/2030
DOL	DOL	*****2426	THE MATRUKH GROUP, INC.		4307 28TH AVE PO BOX 9082ASTORIA NY 11103	10/11/2024	10/11/2029
DOL	DOL		THOMAS LOBDELL		635 WEST DRYDEN ROAD FREEVILLE NY 13068	01/31/2025	01/31/2030
DOL	DOL		TIMOTHY PERCY		29807 ANDREWS ROAD BLACK RIVER NY 13612	10/17/2023	10/17/2028
DOL	DA	*****1050	TRI STATE CONSTRUCTION OF NY CORP.		50-39 175TH PLACE FRESH MEADOWS NY 11365	03/28/2022	03/28/2027
DOL	DOL	*****8485	TULA PLUMBING AND HEATING LLC		120 SEARS AVE ELMSFORD NY 10523	09/26/2025	09/26/2030
DOL	DOL	*****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL		VINCENT CORRAO		PO BOX 393 NANUET NY 10954	09/17/2024	09/17/2029
DOL	DOL		WILLIAM A BELL		7307 WOODSIDE ROAD VICTOR NY 14564	05/06/2025	05/06/2030
DOL	DOL	*****8266	WILLIAM CHRIS MCCLENDON	MCCLENDON ASPHALT PAVING	1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM CHRIS MCCLENDON		1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM SCRIVENS		4192 SIR ANDREW CIRCLE DOYELSTOWN PA 18902	07/18/2024	07/18/2029

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DOL	DOL	*****9494	WND CONSTRUCTION LLC		411 THEODORE FREMD AVENUE SUITE 206RYE NY 10580	09/03/2025	09/03/2030
DOL	DOL		XENOFON EFTHIMIADIS		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 010000 – GENERAL REQUIREMENTS

PART 1 – SCHEDULES AND REPORTS

CONTENTS:

1. Summary of the Work
2. Laws, Ordinances, Taxes, and Permits
3. Plan of Operations and Progress Schedule
4. Sequence of Work
5. Contractor's Examination
6. Notification of Owner and Architect
7. Access and Movement of Materials and Personnel
8. Job Meetings
9. Equal Opportunity
10. Wage Rates

1. SUMMARY OF THE WORK

A. All work as shown on the drawings and as specified herein.

2. LAWS, ORDINANCES, TAXES, AND PERMITS

A. Taxes and Permits:

1. Exempt from New York State Sales Tax.

2. Exempt from Federal Excise Tax.

3. Not subject to building permit fees.

B. Laws and Ordinances:

The Project is subject to and Contractor shall comply with:

1. New York State Wage Rate Requirements.

2. Federal Occupational Safety and Health Administration Standards.

3. Applicable local, state, and other governing safety regulations.

3. PLAN OF OPERATIONS AND PROGRESS SCHEDULES

A. In order to facilitate coordination and fitting, the Contractor shall prepare a "Plan of Operations and Progress Schedule" which shall show concisely the manner in which work will be started, prosecuted, and completed.

B. After approval of the above document, the Contractor shall be responsible for seeing that it is adhered to and for ascertaining that proper coordination is maintained between work of all Contracts.

4. SEQUENCE OF WORK

A. It is intended that the work under this Contract be executed without interruption of and with minimum interference with school operations.

B. Notify utility companies as required by local ordinance and State Law.

C. Ascertain location of utilities inside and outside of building before commencing demolition work of any kind.

D. Take precautions to protect the adjacent spaces and surfaces from flying or falling debris. Prevent dust and dirt from rising and clean any dust created by this work.

E. Contractor shall not employ any labor, materials, or means whose employment or utilization during the course of the work tend to or in any way cause or result in strikes, work stoppages, delays, suspension of work, or similar troubles by workmen under his employ, his Subcontractors, or any of the trades working in or about the premises where work of this Contract is being performed.

F. The work shall be done with due care; the Contractor will be held responsible for any damage which may be caused thereby to any part or parts of existing structures, site, or items designated to remain. Before proceeding with demolition work, ascertain need for and accomplish any required protection measures. Embedded anchorage and attachments shall be removed to permit proper patching. Contractor will be liable for damage caused to any parts of existing structure or work designated to remain.

G. Where removal work occurs or where new and old work join, the immediate adjacent surfaces or so much thereof as is required by the involved conditions shall be cut, removed, patched, repaired, or refinished, and left in as good a condition as existed prior to the commencing of the work. The materials and workmanship employed shall conform to that of the original work.

H. The Contractor shall establish and maintain a rate of work progress so as to insure completion of the construction operations within the time stipulated in the Agreement.

I. Where materials or construction are to be applied or attached to existing surfaces or construction and to have included in his bid all costs for preparatory work on such surfaces or construction as necessary to permit the proper execution of the required work.

J. Upon completion of all work under this Section, the Contractor shall remove all tools, materials, plant, apparatus, and rubbish of any sort. The premises shall be left clean, neat, and orderly to the entire satisfaction of the Architect.

5. CONTRACTOR'S EXAMINATION

A. Contractor shall take all field measurements as required and shall satisfy himself as to the nature of equipment and facilities required for and the conditions under which he will be obliged to carry out the execution of the work in every particular which might in any way affect the cost thereof. The submission of a Proposal will be construed as conclusive evidence that such an examination has been made, and no subsequent claims for additional costs of labor, materials, appliances, equipment, etc., or for difficulties encountered which could have been foreseen has such an examination been made, will be recognized.

6. NOTIFICATION OF OWNER AND ARCHITECT

A. Before starting any work relating to existing utilities or school services, the Contractor will be required to give 24 hours notice to the Architect and Owner and obtain their approval in writing before proceeding with such work.

B. All work involving active utility or school service shall be performed with the utmost dispatch and without discontinuance or disruption of such services except as and when approved by the Owner.

7. ACCESS AND MOVEMENT OF MATERIALS AND PERSONNEL

A. The direction of the Owner as to access to the existing building and the limits within which each Contractor shall control the movements of his personnel and materials shall be strictly followed. Generally, the movement of Contractor's personnel within the premises shall be restricted to the minimum necessary for the performance of required work. Under no circumstances shall Contractor's personnel at any time enter upon any portions of the building or premises where such entry is not strictly necessitated by the work required under this Contract. The Contractor shall rigidly enforce these restrictions; violation thereof shall be cause for dismissal of the offender.

B. Delivery of equipment and materials shall be confined to the limits designated, and storage shall be where directed by the Owner. Temporary enclosures necessary for such storage shall be provided by the Contractor and shall be removed when no longer required.

C. All work in the existing building shall be performed with the least possible annoyance to the occupants of the building.

8. JOB MEETINGS

A. Pre-Construction Conference: Upon receiving notice that he has been awarded the Construction Contract for the project, and within ten (10) days of such notice, the Contractor shall make an appointment to meet with the Architect and his representative(s), and shall also instruct his Subcontractors or their representatives to be made personally known to each other and to plan and initiate the most favorable course of the upcoming construction work.

B. Regular Job Meeting: The Contractor, Architect, and those Subcontractors whose presence is necessary, shall attend periodic meetings for the purpose of discussing the progress and execution of the work. These meetings shall be held at a time and place designated by the Owner’s Representative. The proceedings of these meetings will be recorded by the Owner’s Representative and a copy will be subsequently furnished the Contractor for his use. It will be the Contractor's responsibility to distribute copies, as may be required, to his Subcontractors.

9. EQUAL OPPORTUNITY (LABOR LAW SECTION 220-e)

A. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship. The Contractor agrees to post, in conspicuous places available to employees and applicants for employment, notices to be provided setting forth the provisions of the non-discrimination clause.

B. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

C. The Contractor shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract or understanding a notice to be provided advising the said labor union or worker's representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

D. The Contractor shall comply with Executive Order 11246, Federal Equal Employment Opportunity, unless exempt, in accordance with Section 203 of this order.

10. WAGE RATES

A. The Labor Law of New York State provides, among other things, that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workmen, and mechanics employed on public work projects including supplements for welfare, pension, retirement, vacation, and other benefits, in accordance with prevailing practice in the locality. The Contractor shall comply with all requirements of this law as it applies to this project and locality.

B. The rates of wages determined by the New York State Industrial Commissioner pursuant to the Labor Law are set forth as per the schedule contained within this Project Manual.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 010100 – CONDITIONS OF THIS CONTRACT

A. Before attempting to deliver materials to the site, the Contractor shall inform the Owner's Representative so that arrangements can be made for places of entrance and inspection of materials being delivered.

B. The Contractor shall provide written guarantee of the complete installation to be free from defects in materials and workmanship in accordance with Section 017000. Any portion of the work judged inferior shall be replaced by the Contractor at no additional cost to the Owner.

C. The Contractor shall maintain operational exits, exit lights, danger signs, open trench markings, fire emergency equipment, night lights, and proper storage facilities for equipment and materials as directed through the length of the Contract.

D. The Contractor shall be totally responsible for general site clean up and removal of all materials and equipment related to this Contract at the end of the Contract.

E. The Contractor shall take over and maintain the site immediately after receiving the order to start work. Provide protection of property and utilities until work of the Contract is complete and accepted. The Contractor shall be responsible for the safety of any adjoining property, including paving, utility mains, pipes conduit, etc., and shall, at his own expense, protect and maintain same in at least as good a condition as that in which they were found.

F. All seeded areas, pavements, walks, curbs, and approaches shall be always kept clear and, if disturbed by this construction work, shall be repaired and restored with materials to match existing.

G. Before commencing any work, the Contractor shall verify all coverage, and conditions prevalent at the job sites. If no discrepancies are found, the contractor shall report all corrections in writing. If no corrections are brought to the attention of the School District and the Architect/Engineer before starting installation, the Contractor will be totally responsible for this installation providing complete coverage of the area designated.

H. Upon completion of the work, the Contractor shall furnish as-built drawings showing the exact locations of every new item.

I. It is assumed that Contractor's prices are based on scope of work complete and as confirmed by site(s) inspections prior to bidding.

J. Contractor shall be responsible for all incidental electric and plumbing work required to complete work under this Contract.

K. All repair and patching work shall be done in a professional manner. The Contractor shall take care to match new and existing surfaces and materials as closely as possible for a continuous finish where duplication is impossible.

L. Equivalents: Where, in these specifications, kinds, types, brands, or manufacturers of materials are named, they shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal, and the Contractor may select one of those items. If the Contractor desires to use any kind, type, brand, or manufacturer of material other than those named in the specifications as the basis of the bid, the Contractor shall indicate in writing with the bid, within 72 hours after the bid, or prior to award of contract, what kind, type, brand, or manufacturer is included in the base bid for the specified items, and submit information describing in specific detail wherein it differs from the quality and performance required by the base specifications and such other

information as may be required by the Owner. The Contractor may, at any time, propose to use in the work an equivalent item in lieu of that specified with no change in the bid amount.

M. All prospective bidders shall be required to provide proof of demonstrated competence and experience in this type of work as outlined in these specifications, and each bidder must submit names and addresses of previous jobs completed by his firm, which involved the type of work outlined in the specifications. Bidders are required to complete the “Statement of Bidders Qualifications” form contained herein and submit it with their bids.

N. At least three letters of reference for this type of work completed in the last five years shall be provided upon request, with pertinent company names and addresses of the firms for which the work was done indicating type of work, scope of work, and complete work. The district has the right to verify these letters as well as examine other aspects of the bidder’s work record.

O. As is usual with capital project payments, the district will retain five percent of each payment issued on verified requisitions for payment submitted by the Contractor. This retainage total will be paid upon satisfactory completion of all the work.

P. The maximum gross weight of vehicles used shall not exceed 2,500 lbs. per wheel in the area of playgrounds and athletic fields. The equipment shall be equipped with flotation type tires. On the front lawns, the pounds per square inch exerted on the turf-grass shall not exceed 15 lbs. per square inch and on the back athletic area shall not exceed 32 lbs. per square inch.

Q. The Contractor shall be required to conform to all OSHA requirements regarding Lock-out/Tag-out procedures. This shall include, but not be limited to, disconnecting the power to any equipment to be serviced via a disconnect switch or breaker, locking out this power source, and tagging this lockout with appropriate wording as per OSHA requirements. This shall apply to any power source associated with this project.

R. Certificate of Occupancy: During construction, school district personnel shall monitor the occupied portion of any school building to assure that it complies with the minimum requirements necessary to maintain a Certificate of Occupancy.

S. Complaints: Boards of Education and BOCES shall follow procedures established under Section 155.4 (d) (7) for the investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.

T. Health and Safety Committee: Boards of Education and BOCES shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects.

U. Emergency Plan: The district emergency plan shall be updated to reflect any changes necessary to accommodate the construction process.

V. Fire Drills: Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures.

W. Notification: Boards of Education and BOCES shall establish procedures for notification of parents, staff, and the community in advance of a construction project of $10,000 or more.

X. Fire and Hazard Prevention: The following shall be strictly enforced:

1. During construction, daily inspection of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment, and debris do not block fire exist or emergency rescue windows.

2. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.

Y. Radon: Districts shall take responsibility to be aware of the geological potential for high levels of radon and test and mitigate as appropriate.

Z. Post Construction Inspection: The school district or BOCES shall provide the opportunity for a walk-through inspection by the Health and Safety committee members to confirm that the area is ready for occupancy.

AA. In accordance with the applicable provisions of AHERA (40 CFR §763.84.d) all contractor's are notified that district's buildings do contain asbestos containing building materials (ACBM) and asbestos regulated areas. In addition to the work specified in these project documents, contractors are to review the district's Asbestos Management Plan (AMP) and applicable AHERA Reinspection/Surveillance report for the applicable buildings/work areas prior to performing any work in the school buildings. If your proposed work requires the handling or disturbance of any ACBM, assumed ACBM, any unlisted suspect ACBM, or requires entrance into any asbestos labeled/regulated areas you are required to contact the district's asbestos designated person at the facilities office prior to any work being performed. Any disturbance/handling of ACBM must be performed in accordance with the Asbestos section of these specifications.

Please advise your staff of this requirement and ensure that they sign the short-term worker notification sheet located in the custodian's office prior to the start of any work. If you need any assistance in reviewing the information in this report, please contact the owner or owner's representative.

BB. Some of the proposed work may require various contractors to enter crawlspace or pipe tunnel areas, and/or access plenum spaces associated with the existing ceiling and wall systems (typical throughout). Please be advised that these spaces contain asbestos containing and/or asbestos contaminated materials. The contractor is responsible for all compliance with applicable OSHA regulations pertaining to any occupational exposures to asbestos fibers.

Specifically, certain crawlspaces and pipe tunnels have been identified and placarded by the district as Regulated Areas in accordance with 29 CFR 1910 (OSHA). The contractor must perform the following entry/exit procedures for all Regulated Areas identified by the school district.

1. All persons entering the regulated area (i.e. crawlspace) shall don protective coveralls including shoe coverings, prior to entry.
2. Each person exiting the crawlspace shall, while still inside the crawlspace, remove the protective coveralls, immediately before stepping out of the crawlspace onto a walk-off pan/pad. All protective coveralls shall remain in the crawlspace for future disposal as asbestos contaminated waste.
3. All personnel shall ensure that the areas outside the crawlspace are visibly free of sand, dust, etc. subsequent to their exit.
4. The contractor shall notify the owners representative when work will be undertaken in these areas so that an independent monitoring firm can be available to monitor the activities within these spaces.

CC. If the contractor encounters damaged or inadvertently disturbs any ACBM, work should stop immediately, and the contractor notify the owner/owners representations. Any abatement/disturbance of these materials must be performed in accordance with the Asbestos section of these specifications.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 010200 – INSURANCE REQUIREMENTS

CONTENTS:

1. General Requirements
2. Certificates of Insurance
3. Types of Coverage and Minimum Limits
4. Continuity

1. GENERAL REQUIREMENTS

A. In addition to the requirements specified under Article 11 of the General Conditions and the insurance required by law, the Contractor shall, before commencing work under this Contract and during the period of construction to the date of final acceptance by the Owner, purchase, effect, and maintain insurance coverage as described in this section.

B. No Subcontractor shall be permitted to undertake any portion of this Contract without first having presented to the Contractor certification attesting to similar coverages as are required of the Contractor under this section. Such certification shall be issued to and in a form acceptable to the Contractor.

C. Notwithstanding any terms, conditions or provisions, in any other writing between the parties, the Contractor agrees to effectuate the naming of the Owner, the Architect and the Construction Manager (when applicable) as Additional Insureds on the Contractor's insurance policies, with the exception of Workers' Compensation and NY State Disability.

D. Each policy naming the Owner, the Architect and the Construction Manager (when applicable) as additional insureds shall:

1. Be an insurance policy from an A.M. Best A- rated or better insurer, licensed and admitted to conduct business in New York State. A New York licensed and admitted insurer is required.
2. State that the organizations coverage shall be primary and non-contributory coverage for the Owner, its Board of Education, employees and volunteers including a waiver of subrogation in favor of the Owner for all coverages including Workers Compensation.
3. Additional Insured status for General Liability coverage shall be provided by standard or other endorsements that extend coverage to the Owner, the Architect and the Construction Manager (when applicable) for both on-going operations (CG 20 38 or equivalent) and products and completed operations (CG 20 37 or equivalent), latest version. The decision to accept an endorsement rests solely with the Owner. A completed copy of the endorsements must be attached to the Certificate of Insurance to include General Liability, Auto Liability and Umbrella/Excess coverages. A copy of the Acord 855 Form is required to be sent for review. Contracts with subcontractors shall require them to provide the same additional insured coverages and documents.

2. CERTIFICATES OF INSURANCE

A. Certificates of Insurance shall be transmitted in duplicate to the Architect for forwarding to the Owner, and any Certificate found to be incomplete or not according to the proper form will be returned as being unsatisfactory. A letter of transmittal from each insurance company involved must be submitted certifying that the certificate is issued pursuant to their authorization.

B. The certificate of insurance must describe **all services** provided by the contractor (ie. roofing, carpentry or plumbing, etc.) that are covered by the liability policies.

C. At the Owner's request, the Contractor shall provide a copy of the declaration page of the liability and umbrella/excess policies with a list of endorsements and forms. If requested, the Contractor will provide a copy of the policy endorsements and forms.

D. There will be no coverage restrictions and/or exclusions involving New York State Labor Law statutes or gravity related injuries.

E. No policies containing escape clauses or exclusions contrary to the Owners interests will be accepted.

F. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/05) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this form - additional details must be provided in writing. Policy exclusions may not be accepted.

E. The Contractor agrees to indemnify the Owner for any applicable deductibles and self-insured retentions.

G. Certificates shall contain:

1. Name and address of the insured.
2. Job location and title of the Contract.
3. Policy number and expiration date.
4. Issuance date of Certificate.
5. Types of coverage included.
6. Limit of Liability for each type used.
7. Types of operations covered (Classifications).
8. Types of operations or of coverages specifically excluded.
9. Thirty (30) day cancellation or non-renewal notice.
10. Owner, Architect or Owner representatives as additional insured.
11. Hold Harmless Clause indemnifying Owner, Architect or Owner representatives.
12. Name of Insurance Company.

H. The delivery of Certificates of Insurance authorizes the Owner or Architect to make direct inquiry of and to receive direct response from the insurance carrier regarding questions arising during the performance of the Work which are pertinent to the coverages under the policies.

3. TYPES AND MINIMUM LIMITS OF COVERAGE

A. The Contractor will obtain and keep in full force and effect during the term of the Contract, at the Contractor's sole cost and expense, the following insurance:

B. Commercial General Liability Insurance
- $1,000,000 per occurrence/ $2,000,000 aggregate
- $2,000,000 Products and Completed Operations
- $1,000,000 Personal and Advertising Injury
- $100,000 Fire Damage
- $10,000 Medical Expense
- The general aggregate must apply on a per-project basis. Products and completed operations coverage must remain in effect for three years after project completion and acceptance of the work performed.

C. Automobile Liability
- $1,000,000 combined single limit for owned, hired and borrowed and non-owned motor vehicles.

D. Workers' Compensation and NYS Disability Insurance
   - Statutory Workers' Compensation (C-105.2 or U-26.3); and New York State Disability Insurance (DB-120.1) for all employees (per NYS WC and Disability Laws). Proof of coverage must be on the approved specific form, as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 form with New York State. The form can be completed and submitted directly to the Workers' Compensation Board online.

E. Builders Risk
   - Must be purchased and maintained by the Owner of the property. The limit must reflect the total completed value – all material and labor costs, and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood. Coverage will remain in effect until the project is completed and/or the property occupied and put to its intended use.

F. Umbrella/Excess Liability Insurance
   - Umbrella/Excess coverage shall be on a follow-form basis or provide broader coverage over the General Liability and Auto Liability coverages.

   - $5 million each Occurrence and Aggregate for general construction work and no work at elevation (1 story or 10 feet) and project values less than or equal to $1,000,000.

   - $10 million each Occurrence and Aggregate for high-risk construction, work at elevation (>1 story or 10 feet) and project value greater than $1,000,000.

G. Asbestos/Lead Abatement/Pollution Liability Insurance
   - $2,000,000 per Occurrence/$2,000,000 Aggregate, including products and completed operations. Such insurance shall include coverage for the Contractors operations including, but not limited to, removal, replacement, enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the Contract.

   - If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor must maintain pollution liability broadened coverage (ISO Endorsement CA 9948 or CA 01 12) as well as proof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion.

   - Testing Company Errors and Omission Insurance: $1,000,000 per Occurrence/$2,000,000 Aggregate for the testing and other professional acts of the Contractor under the Contract with the Owner.

H. Owners Contractors Protective (OCP) Insurance: The Contractor will obtain and keep in full force and effect during the term of this Contract, at the Contractor's sole cost and expense, Owners Contractors Protective (OCP) Insurance. The Owner will be the Named Insured on all OCP policies and there will be no additional insureds.

   1. For projects less than or equal to $1,000,000 and work on one (1) story (10 feet) only; $1 million per occurrence, $2 million aggregate with the Owner as the Named Insured.
   2. For projects greater than $1,000,000 and/or work over one (1) story (10 feet); $2 million per occurrence, $4 million aggregate with the Owner as the Named Insured.
   3. The OCP Policy must be with a NYS licensed and admitted carrier.

I. Cyber: The contractor must carry coverage applicable to the first- and third-party claims, arising from a cyber incident that could impact the Owners data the contractor may have in their possession. Limits shall be the greater of those carried by the Contractor or $250,000 per incident and $250,000 in the aggregate. If coverage is on a claims-made basis, coverage must have a retroactive date no later than the date of agreement with the Owner and provide coverage for two years following the date of Final Completion of the project. **The Cyber policy must be with a NYS licensed carrier.**

J. Contractor's Contingent Liability: The Contractor shall procure, pay for, and maintain such insurance as will protect the Contractor from his contingent liability for damages and for injury to the person or property of another which may arise from the operations of all Subcontracts under this Contract.

K. Contractor's and Employees' Equipment: The Contractor assumes responsibility for all injury to or destruction of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form work, and personal property of Contractor's employees from whatever cause arises.

4. CONTINUITY

A. Contractor acknowledges that failure to obtain the foregoing insurance on behalf of the Owner constitutes a material breach of contract and subjects it to liability for damages, indemnification and all other legal remedies available to the Owner. The Contractor is to provide the Owner with a certificate of insurance, evidencing the above requirements have been met, prior to the commencement of work. The failure of the Owner to object to the contents of the certificate or the absence of same not be deemed a waiver of any rights held by the Owner.

In addition, the Contractor shall be responsible for the indemnification to the Owner and the Architect, of all costs associated with such lapse in coverage, including but not limited to reasonable attorney's fees.

B. Subcontractors are subject to the same terms and conditions as stated herein and must submit to the Owner for approval prior to the start of any work.

C. In the event the General Contractor fails to obtain the required certificates of insurance from the Subcontractor and a claim is made or suffered, the General Contractor shall indemnify, defend and hold harmless the Owner, its Board, employees, volunteers, the Architect and the Construction Manager (when applicable) from any and all claims for which the required insurance would have provided coverage. **This indemnity obligation is in addition to any other indemnity obligation provided in the contract.**

D. The Contractor assumes responsibility for all injury or destruction of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form work, and personal property of the Contractor's employees from whatever cause arises. Any policy of insurance secured covering the Contractor or Subcontractors leased or hired by them and any policy of insurance covering the Contractor or Subcontractors against physical loss or damage to such property shall include an endorsement waiving the right of subrogation against the Owner for any loss or damage to such property.

E. The Owner in good faith may adjust and settle a loss with the Contractor's insurance carrier.

F. The Owner and the Contractor waive all rights against each other and any of their Subcontractors, Sub-subcontractors, agents and employees for damages caused by fire or other perils to the extent of actual recovery of any insurance proceeds under any property insurance policy procured or other property insurance applicable to the Contractor's Work.

G. Before commencement of its Work, the Contractor shall obtain and pay for such insurance as may be required to comply with its obligations pursuant to the Contract, including, but not limited to any indemnification and hold harmless provisions.

H. Review and acknowledgment of the Certificate of Insurance or other proof of insurance by the Owner or the Architect shall not relieve or decrease the liability of the Contractor hereunder.

I. If the terms of policies expire before the Contract is completed or during the period of completed operations coverage, and the Contractor fails to maintain continuance of such insurance, the Owner is entitled to provide protection for itself, to pay premiums therefor, and to charge the cost thereof to the Contractor.

J. In the event of loss by fire or other insured hazard during the term of the Contract, the Contractor shall cooperate with the Owner and Architect and the insurance adjusters in all procedure's incidental to the expeditious adjustment of the loss and shall during this period maintain progress of construction. The Contractor will not be relieved from his obligations for the proper execution of his Contract except that the time of completion may be extended for such number of days as may have been delayed by reason of such loss, as determined by the Architect.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 010300 – GOVERNING LAWS

GOVERNING LAWS

This project is governed by, but not limited to, the following laws:

- General Municipal Law, § 101, regarding separate contracts when total project exceeds $1,500,000
- General Municipal Law, § 103-d, regarding non-collusive bidding clause.
- General Municipal Law, § 106-b, regarding payment of contractors and subcontractors.
- General Municipal Law, § 108, regarding Worker's Compensation Insurance.
- General Municipal Law, § 109, regarding non-assignment of public contract.
- Labor Law, § 220, subdivision 2, regarding 40-hour week, 8-hour day.
- Labor Law, § 220-d, regarding wage rates and supplements.
- Labor Law, § 220-e, regarding anti-discrimination.
- Labor Law, § 222-a, regarding elimination of dust hazard.

SECTION 011000 - SUMMARY OF WORK - MULTIPLE PRIME CONTRACTS

1.1 PROJECT INFORMATION

A. Project: Waverly School
B. Project Location: Eastchester, NY
C. Owner: Eastchester Union Free School District
D. Architect: BBS Architects & Design
E. Construction Manager: Arris Contracting Company, Inc.
F. The overall scope of work includes:

Waverly School -

The contractor shall provide all labor, materials, equipment and services to furnish deliver and install all materials and related work as shown on the drawings, as required by these specifications and/or as directed by the Architect/Construction Manager. The Work shall include the following: General demolition & ACM abatement; Metal stud framing, blocking, GWB, tape & spackle, and paint; Doors & Hardware; ACT, floor & wall tiles; Casework, metal shelving, and partitions; Plumbing piping & fixtures; Mechanical ductwork & insulation; Electrical, Fire Alarm & Low Voltage wiring, panels, lighting fixtures & devices, and controls; Boiler piping & peripheral components; CUHs, UVs, RTU & Chiller; Transformer; Bathroom & Classroom accessories.

G. Contracts:

1. The Project will be constructed under a multiple prime contract arrangement.

2. Prime contracts are separate contracts between the Owner and separate contractors, representing significant construction activities. Each prime contract is performed concurrently with and closely coordinated with construction activities performed on the Project under prime contracts. Prime contracts for this Project include:

a. General Work Contract (GC or GWC)

b. Mechanical Work Contract (MC, HVAC or HC)

c. Electrical Work Contract (EC or EWC)

d. Plumbing Work Contract (PC or PWC)

1.2 DIVISION OF WORK

The contract shall include all labor materials, plans, tools, equipment and supervision which are required for or incidental to the proper completion of the work as indicated on the drawings and described in the following specification sections:

1.3 GENERAL REQUIREMENTS

1. All DIVISION 00 Sections
2. All DIVISION 01 Sections

Special Notes:

1. Work hours M-F 7:00AM – 4:30PM. Contractor will appropriately man the project to avoid Saturday and Overtime hours which result in Owner, Construction Manager and Architect additional costs. (2nd shift where indicated by Milestone schedule 3:00 pm – 11:00 pm)
2. Delivery black out times- No Contractor trucks/deliveries are allowed during school bus times as indicated by owner approx. **7:00 am-8:30 am or 2:00 pm -3:30 pm**.
3. Contractor to include all required insurance coverages as outlined by the General Conditions and front-end sections in their base bid. Provide renewals ahead of expiration. No contractors will be allowed onsite if their insurance has expired.
4. Contractor is specifically reminded of their responsibilities for clean up as per Section 017423. Maintaining a clean jobsite is considered a safety issue and will be strictly enforced. In addition to daily cleaning, the contractor is required to completely clean all areas affected by construction work at the end of the project. If the contractor does not properly perform this function when directed by the Owner/CM, within 4 hours of being notified the owner will perform the work with others and deduct the cost from the contractor.
5. Contractor shall provide suitable rubbish containers device(s) for their own use (both demolition and construction debris), properly maintained and serviced, replaced as required and protected from access by the public fencing as may be specified herein or approved by the Architect or Construction Manager.
6. Existing building space may not be used for storage unless approved by Owner.
7. Contractor is required to submit their corporate safety policy within 10 days of receipt of the Notice to Proceed. Said Policy must minimally meet OSHA Standards and define details concerning the maintenance of a safe work environment and shall also define practices for the maintenance of hygiene and minimizing of the spread of infectious / contagious diseases.

1.4 GENERAL WORK CONTRACT

In addition to the General Requirements, Division 1, included in this bid package contractor shall provide for proper completion of work as indicated on all drawings and in accordance with the terms and conditions described in the following sections:

DIVISION 02 – EXISTING CONDITIONS

Section 024119 – Selective Demolition
Section 028000 – Asbestos Work Under This Contract
Section 028000.1 – QUEST Document 1
Section 028000.2 – QUEST Document 2
Section 028100 – Asbestos Handling Certificate (Only if Asbestos Project)
Section 028218 – Abatement of Asbestos Flooring/Mastic - Scrape Method
Section 028219 – Abatement of Asbestos Flooring/Mastic – Liquid Chemical Scrape Method
Section 028300 – Abatement of Sand Cellars/Crawl Spaces
Section 029000 – Lead Containing Materials Abatement

DIVISION 03 – CONCRETE

Section 030100 – Concrete Surface Preparation for Coating
Section 030130 – Concrete Reconstruction and Resurfacing (Non-Structural)
Section 030130.61 – Interior Horizontal Concrete Resurfacing (Topping)
Section 033000 – Cast-in-Place Concrete

Section 035413 – Self Leveling Gypsum Underlayment
Section 035416 – Self Leveling Cementitious Underlayment

DIVISION 04 – MASONRY

Section 040100 – Masonry Restoration and Cleaning
Section 040120 – Masonry Surface Preparation for Coating
Section 042000 – Unit Masonry

DIVISION 05 – METALS

Section 050530 – Cold Galvanizing
Section 051200 – Structural Steel Framing
Section 052100 – Steel Joist Framing
Section 053000 – Metal Decking
Section 054000 – Cold Formed Metal Framing

DIVISION 06 – WOODS, PLASTICS AND COMPOSITES

Section 061000 – Rough Carpentry
Section 062000 – Finish Carpentry

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

Section 072100 – Building Insulation
Section 072113 – Ultra Wall Insulation and Air Barrier System
Section 072114 – Mineral Board Insulation (Thermafiber)
Section 072600 – Vapor Retarders
Section 075323 – EPDM Roofing System Fully Adhered
Section 076000 – Flashing and Sheet Metal
Section 078413 – Penetration Firestopping
Section 078443 – Joint Firestopping
Section 079100 – Exterior Wall Joint Seals (Emseal)
Section 079200 – Joint Sealants

DIVISION 08 – OPENINGS

Section 081113 – Hollow Metal Doors and Frames
Section 081416 – Flush Wood Doors
Section 087100 – Door Hardware

DIVISION 09 – FINISHES

Section 092300 – Gypsum Plaster
Section 092900 – Gypsum Wall Board
Section 093013 – Porcelain and Glazed Ceramic Tile
Section 095000 – Acoustical Ceiling Systems

Section 095316 – Acoustical Tile Restoration
Section 096519 – Resilient Tile Flooring
Section 099000 – Painting

DIVISION 10 – SPECIALTIES

Section 101400 – Signage
Section 102113 – Metal Toilet Compartments
Section 102119 – Plastic Toilet Compartments
Section 102813 – Toilet Accessories

DIVISION 11 – EQUIPMENT

(Not Applicable)

DIVISION 12 – FURNISHINGS

Section 122400 – Manual Operated Roller Shades
Section 123213 – Wood Casework and Classroom Wardrobe Units

DIVISION 13 – SPECIAL CONSTRUCTION

(Not Applicable)

DIVISION 14 – CONVEYING EQUIPMENT

(Not Applicable)

DIVISION 31 – EARTHWORK

DIVISION 32 – EXTERIOR IMPROVEMENTS

1.5 MECHANICAL WORK CONTRACT

In addition to the General Requirements, Division 1, included in this bid package contractor shall provide for proper completion of work as indicated on all drawings and in accordance with the terms and conditions described in the following sections:

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

Section 230000 – General Provisions
Section 230010 – Codes, Standards and Permits
Section 230300 – Basic Mechanical Materials and Methods
Section 230400 – Painting of Mechanical Work
Section 230513 – Common Motor Requirements for HVAC Equipment
Section 230516 – Expansion Compensation
Section 230519 – Meters and Gauges for HVAC Piping
Section 230523 – General Duty Valves for HVAC Piping
Section 230548 – Vibration Controls for HVAC
Section 230580 – Mechanical Testing Requirements

Section 230593 – HVAC Testing, Adjusting and Balancing
Section 230680 – Fire Stopping
Section 230700 – HVAC Insulation
Section 230713 – Duct Insulation - Interior
Section 230714 – Duct Insulation - Exterior
Section 230800 – Commissioning of HVAC
Section 230923 – TC Spec – EcoSpec BBS (8-17-23 Prelim)
Section 230993 – Sequence of Operations (3-3-25 Prelim)
Section 232113 – Hydronic Piping
Section 232116 – Hydronic Piping Specialties
Section 232123 – Hydronic Pumps
Section 233000 – Air Distribution
Section 233113 – Ductwork
Section 233300 – Duct Accessories
Section 233400 – Fans
Section 233543 – Variable Frequency Drives
Section 233713 – Diffusers, Registers and Grilles
Section 236400 – Packaged Water Chillers – QTC3 (11-26-25)
Section 238223 – Unit Ventilators

DIVISION 25 – INTEGRATED AUTOMATION

(Not Applicable)

1.6 ELECTRICAL WORK CONTRACT

In addition to the General Requirements, Division 1, included in this bid package contractor shall provide for proper completion of work as indicated on all drawings and in accordance with the terms and conditions described in the following sections:

DIVISION 26 ELECTRICAL

Section 260500 – Common Work Results for Electrical
Section 260519 – Low Voltage Electrical Power Conductors and Cables
Section 260526 – Grounding and Bonding
Section 260529 – Fasteners, Attachments and Supporting Devices
Section 260532 – Raceways, Fittings and Accessories
Section 260534 – Outlet Junction and Pull Boxes
Section 260543 – Underground Cable and Conduit Systems
Section 260553 – Identification of Electrical Systems
Section 260573 – Short Circuit, Protective Device Coordination, Arc Flash Studies
Section 260810 – Mandatory UL Participation
Section 262416 – Panelboards
Section 262726 – Wiring Devices
Section 262816 – Heavy Duty Safety Switches
Section 265100 – Interior Lighting
Section 265600 – Exterior Lighting

DIVISION 27 COMMUNICATIONS

Section 271501 – Communications and Horizontal Cabling
Section 272000 – Data Communications Network Equipment
Section 275116.10 – PA Sound System – Modify or Expand Existing System
Section 282100 – Surveillance Cameras

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

Section 284613.10 – Fire Alarm System (Modify Existing)

DIVISION 33 – UTILITIES

(Not Applicable)

1.7 PLUMBING CONTRACT WORK

In addition to the General Requirements, Division 1, included in this bid package contractor shall provide for proper completion of work as indicated on all drawings and in accordance with the terms and conditions described in the following sections:

DIVISION 21 – FIRE SUPPRESSION

(Not Applicable)

DIVISION 22 – PLUMBING

Section 220000 – Plumbing General Provisions
Section 220010 – Codes, Standards & Permits
Section 220020 – Cutting and Patching
Section 220030 – Schedule of Equivalency
Section 220100 – Maintenance Instructions
Section 220300 – Plumbing Basic Materials & Methods
Section 220553 – Plumbing Identification Systems
Section 220555 – Access to Plumbing Work
Section 220680 – Fire Stopping
Section 220719 – Plumbing Insulation
Section 220801 – Plumbing Testing, Adjusting & Balancing
Section 221000 – Plumbing Piping Systems
Section 221316 – Sanitary Waste and Vent Piping
Section 224000 – Plumbing Fixtures and Trim

DIVISION 33 – UTILITIES

1.8 PRIME CONTRACTOR'S USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the work is indicated.

B. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
C. Owner's representative(s) will cover the project for the standard Monday – Friday shift. If contractor requests additional hours to make up schedule time or weekends, he will need to reimburse Owner for additional coverage or costs (e.g. – Architect, Construction Manager, etc.) at their contractual rate.
D. General: Limitations on site usage as well as specific requirements that impact utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements, the Contractor(s) shall administer allocation of available space equitably among the separate sub-contractors and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project. The Contractor(s) shall schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
E. After the equipment is no longer required for the work, it shall be promptly removed from the project site. Protection of construction materials and equipment stored at the project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor(s).
F. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off-site.
G. Contractor(s) and any entity for which the Contractor is responsible shall not erect any sign of the Project site without the prior written consent from the Owner, which may be withheld in the sole discretion of the Owner.
H. Contractor(s) shall ensure that the work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the work and all adjacent areas. The work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of: Any areas and building adjacent to the site of the work or the building in the event of partial occupancy.
I. Repair damage caused by construction operations. Take all precautions necessary to protect the building during the construction period.
J. Each Prime Contractor is responsible for maintaining a safe jobsite. This includes actively reviewing their work areas to ensure that they are in compliance with all required OSHA regulations. It is a contract requirement that each contractor conducts weekly tool-box safety meetings to ensure that their employees are properly educated and utilizing safe work practices. (Copies of these weekly meetings and a list of the attendees will be forwarded to the CM Site Superintendent on a weekly basis). Contractor(s) will comply with all requirements outlined in the General Conditions including providing their employees with PPE (personal protective equipment) such as masks, hand sanitizer, hard hats, proper work boots, safety harness, safety glasses, etc.
K. Smoking, drinking alcoholic beverages or open fires will not be permitted on the project site.
L. Utility Outages and Shutdown:
    1. Limit the disruption of utility services to hours the site is unoccupied, weekends or holidays at no additional cost.
    2. Do not disrupt or shut down line safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days' notice to Owner and authorities having jurisdiction.
    3. Prevent accidental disruption of utility services to other facilities.
    4. All costs for manning of temporary shutdowns and utility crossovers, including 24-hour fire watch if necessary, are included in the contractor's bid regardless of weekend, holiday, etc.

1.9 OCCUPANCY REQUIREMENTS

A. Partial owner Occupancy: The Owner reserves the right to occupy the place and install equipment in completed areas of the work prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work, such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

B. The Architect will prepare a Certificate of Substantial Completion for each specific portion of the work to be occupied prior to Owner occupancy.

C. Prior to partial Owner occupancy, electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain electrical systems serving occupied portions of the site.

D. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions of the site.

1.10 DEFINITIONS

A. Definitions as applied to “Contractors” involved with the work of this Project:

1. “The Contractor” or “Contractor” meaning that Respective Prime Contractor normally responsible for the specified work referenced.

2. “Respective Prime Contractor meaning either the; General Contractor; Plumbing; HVAC; Electrical; Sitework; & Fire Protection Contractors normally responsible for the specified work referenced.

3. “Trade Contractor” meaning that Respective Prime Contractor as above; and such other terms relating to Contractors to be taken in context with respect to the referenced work.

4. Further, wherein said Division 0 and 1 and respective Sections therein, any reference is made to “General Contractor”, same shall be construed to mean “Contractor for the General Construction, or General Work Contractor”.

B. The Owner cannot guarantee the correctness of the existing conditions shown and assumes no responsibility therefore, it shall be the responsibility of the Contractor to visit the site and verify all existing conditions prior to bid.

C. The Owner may purchase certain items required for the overall operation of this facility through outside vendors.

D. The Contractor(s) will cooperate with said vendors as may be necessary to permit the work to be accomplished.

1. The cooperation may extend to the receiving, unloading and placement of said equipment if directed by the Owner.
2. Each Contractor is advised that the Owner may enter into separate contracts as may be in their best interest.
3. Each Contractor is further advised that there will be a full on-site Project Representative/Construction Manager, whose duties will be defined at the pre-construction meeting.

1.11 ADDITIONAL SECURITY PROVISIONS

A. Contractors' employees shall use a single means of access and egress, except in the case of emergency, to be designated by the Construction Manager.

B. Contractor and each Subcontractor shall require his employees, while on the job site, to wear, in a conspicuous location, a photo I.D. badge bearing the name of the employee and the Contractor. The badges of Contractor shall be numbered consecutively. An up-to-date list of all I.D. badges, indicating the name and number for each employee, shall be furnished to the Construction Manager.

1.12 ASBESTOS AND LEAD PAINT AWARENESS REQUIREMENTS

A. Contractor agrees not to use or permit the use of any asbestos containing material in or on any property belonging to the Owner.
B. For the purposes of this requirement, asbestos free shall mean free from all forms of . asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite, both in friable and non-friable states and without regard to the purposes for which such material is used.

1.13 CONSTRUCTION TIME AND PHASING REQUIREMENTS

A. Each Contractor is advised the "time is of the essence" of the Contract as defined in the "General Conditions" for the completion of the construction of the facility. It is understood that the work is to be carried through to completion with the utmost speed consistent with good workmanship.

B. Time of Completion shall be as established in the Milestone Schedules (Section 011100).

C. Contractor shall maintain fences and barricades at all times and shall repair/ restore and/ or pay for any temporary fencing damaged by their work.

D. Maintain at all times, all exits and walkways.

E. Where the barricade is removed for work, the Contractor performing such work shall provide adequate safety personnel to prevent unauthorized persons from approaching the work area.

F. Construction Phasing: The phasing and/ or milestone schedule contained in Section 011100 has been established for the overall construction of the project.

G. Electrical services to the functioning spaces shall be maintained at all times.

H. Swing-overs to new facilities shall be made so as to cause the least interruptions to the facilities' operations.
I. Contractor shall provide and maintain all required separations between old and new construction to prevent:
    a. Unauthorized entrance to construction areas by others than Architect, Construction Manager, or Owner.
    b. Heat loss from existing building, water (rain or ground) infiltration into existing building.

J. Exterior alteration and restoration, as required, may proceed outside of phasing schedule at the Contractor's option with concurrence from the Architect, Construction Manager and Owner.

K. Site development work shall proceed in such a manner to cause the least amount of disruption to the ongoing operations as possible.

1.14 PROOF OF ORDERS, DELIVERY DATES AND SUPPLY CHAIN TRACKING

A. Within 2 weeks after the approval of shop drawings, samples, product data and the like, the Contractor shall provide copies of purchase orders for all equipment and materials which are not available in local stock. The Contractor shall submit written statements from suppliers confirming the orders and stating promised delivery dates. Failure to provide this critical information will result in Owner holding monthly requisition payments until received.

B. To mitigate potential disruptions in material supply chains, the Contractor must procure all necessary project materials in advance and store them onsite in their own Conex boxes. This requirement applies to commonly available materials such as piping, conduits, wire, and metal studs. The owner will compensate for these stored materials upon delivery to the jobsite, as outlined in Section 012900.

C. This information shall be incorporated within the progress schedules so required as part of Section 013216 and 013300 and shall be monitored so as to ensure compliance with promised dates.

1.15 FIELD MEASUREMENTS

Each Respective Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.

1.16 INITIAL SUBMITTAL REQUIREMENTS

As outlined in Division 01, each Contractor shall provide items noted including - bonds, insurance, emergency telephone numbers, progress scheduling, schedules of submittals, subcontractor listings and the like prior to the start of any work. The owner will not issue contracts until all bonds and insurance information is received by the contractor and verified correct.

1.17 SCHEDULES

The milestone schedule presented in the documents is for bidding and general purposes. Due to the nature of the work, it is the intention of the Construction Manager to negotiate actual work periods for the project in coordination with the Contractor involved with this bidding process, as well as separate contractors involved with other phases of the work solicited under separate proposals. Contractor shall, under terms of the General Conditions, mutually cooperate in the rescheduling of work to permit an uninterrupted use of the facilities by the Owner, without additional cost to the Owner.

1.18 ADDITIONAL REQUIREMENTS

The following are additional general and special requirements which will govern the work of the projects covered by these Documents.

A. If it appears that some of the work cannot be completed by the scheduled date, the Contractor shall increase the work force or increase the hours of work, including evenings and weekends as necessary, and cover any additional costs to the Owner, Architect and Construction Manager.

B. If the work is complete but the area has not been cleaned or debris and equipment remain, the Owner and/or Construction Manager will notify the Contractor of the deficiencies. The Contractor will have up to four hours to clean the specified area(s) to the satisfaction of the Owner and/or Construction Manager. If the Contractor fails to do so, the Owner reserves the right to prepare the area for occupancy using their own resources and deduct the associated costs from the Contract amount.
C. Contractor must plan, provide and maintain his own access, ramping and egress as required into and out of the site, staging of trailer(s), materials, machinery, and equipment in agreement with the Construction Manager's Superintendent. Maintain free and safe access on the jobsite for other related project personnel. Maintain safe pedestrian or vehicular traffic must be regulated by a flagman. Trucking and delivery operation should be coordinated with Construction Manager's Superintendent and all other trades.
D. Contractor is responsible to maintain existing site fencing in its existing condition. Modifications of the fence to better accommodate the contract work can be discussed with the Construction Manager. These changes shall than be handled by this Contractor at his expense and in accordance with the Construction Manager's Superintendent's direction. Any cost incurred as a result of damages shall be changed to this Contractor.
E. Contractor's personnel will not be permitted to use Owners facilities (including toilet, telephone, food services, etc.) for their own benefit. Contractor's Superintendent must explain this to all their field forces.
F. Contractor shall limit his operations including storage of materials and prefabrication to areas within the Contract Limit Lines.
G. Contractor shall coordinate the use of premises with the Owner and Construction Manager and shall move at his own expense any stored products under Contractor's control, including excavated material, which interfere with operations of the Owner or separate Contractors.
H. Contractor shall obtain and pay for off-site storage as needed to maintain the Owner's use of their premises. The costs of any required storage shall not be an additional expense to the Owner.
I. Contractor shall assume full responsibility for the protection and safekeeping of products under this Contract stored on the site and shall cooperate with the Construction Manager to ensure security for the Owner's Property.
J. The intention of the work is to follow a logical sequence; however, the Contractor may be required by Construction Manger to temporarily omit or leave out any section of his work or perform his work out of sequence. All such out of sequence work and come back time to these areas shall be performed at no additional cost.
K. Contractor shall submit a three-week (man-loaded work activity and area) to Construction Manager each week. Contractor's representative shall attend a weekly meeting with all contractors, chaired by Construction Manager, for the purpose of job coordination and sequencing.
L. Contractor is responsible to coordinate the job with other trades and Construction Manager, and to cooperate with other trades in pursuit of the overall project's coordination drawings and actively participate in resolving discrepancies, conflicts, interferences, etc.
M. The Contractor shall take special care in verifying that his equipment matches the characteristics of the power being supplied.
N. Any Contractor personnel including Project Managers, Supervisors, etc. who engage in any personal attacks, belligerent or threatening speech/texts, etc., to the Owner, or any of its agents, will be removed from working on the project.
O. Unsafe practices, horseplay, abusive behavior or language, wanton destruction of property, use of drugs or alcohol, possession of firearms, and solicitation shall not be tolerated. There will be no warnings, and Contractor shall designate a responsible on-site Supervisor to handle any situations that may arise, including termination.

P. Contractor is responsible to supply and install all blocking/bracing necessary to properly secure their work. This responsibility includes coordinating the installation in concealed areas without delaying other trades.
Q. Union business shall not be conducted on site. Any Union representative that visits the site must declare what Contractor's personnel they represent and must be escorted by that Contractor's Union steward at all times. No visitors, sales representatives or non-working personnel shall be permitted on site without prior consent of the Construction Manager. No photographs shall be taken without the Construction Manager's prior approval.
R. Contractor shall provide protection from damage to adjacent and adjoining work and/or structures. Contractor shall clean, repair and/or replace any damage for which this Contractor is responsible.
S. Contractor shall submit hourly rate sheets that would apply to time and material work for all pertinent trades upon Award of Contract.
T. Contractor shall examine surfaces and conditions prior to start of work. Report unacceptable conditions to the Construction Manager. Do not proceed until unacceptable conditions are corrected and acceptable. Starting work implies acceptance of existing conditions.
U. Contractor shall include general housekeeping of light debris. All debris from Contractor will be collected daily and disposed of into their dumpsters. In addition to daily general housekeeping, the Contractor shall provide a weekly broom sweep and damp mop of all areas for the entire duration of the project. The broom sweep shall include debris from all trades working on site.
V. Sleeves and Sleeve Layout – It is the responsibility of the Contractor requiring a sleeve to provide the sleeve and a layout sketch to the Contractor performing the construction activity that the sleeve goes in.
W. Limited site space is available in areas as designated by the Construction Manager. Construction trade parking is not permitted in Owner's employee parking lot.
X. Prior to commencing the work, Contractor shall provide written acceptance of grades, structures, substrates, and/or systems installed by other Contractors as suitable for installation of his work. Failure to provide this verification prior to commencing work shall constitute acceptance of the existing conditions.
Y. Contractor shall coordinate with the Construction Manager for lay down areas, staging areas, and overall use of project site.
Z. Contractors and their employees, subcontractors and supplier are expressly prohibited from entering the occupied areas of the school building during school hours without prior written permission of the Construction Manager and for using any of its facilities (i.e. restrooms, cafeteria, etc.).

No recycled import fill materials are permitted.

END OF SECTION 011000

SECTION 011100

MILESTONE SCHEDULE

Part 1 - GENERAL

1.1 Milestone

The following milestone schedule serves as basis for bidding. A Final Construction Schedule will be developed at a general meeting within 21 days of Letter of Intent to Award the Contracts. Contractor will coordinate activities, forward submittals, deliver materials and provide the necessary workforce to meet the milestones listed below.

1.2 Schedule

EUFSD Phase 5A – Waverly School	**Start**	**End**
• **ALL SUBMITTALS**	**11/15/26**	**12/30/26**
• **Area 'A' Mobilization / Demolition**	**06/25/27**	**07/09/27**
• **Area 'B' Mobilization / Demolition & Abatement**	**06/25/27**	**07/16/27**
• **Area 'A' Metal Stud Framing**	**07/13/27**	**07/14/27**
• **Area 'B' Metal Stud Framing**	**07/19/27**	**07/23/27**
• **Area 'A' MEP Rough Installations**	**07/02/27**	**07/16/27**
• **Area 'B' MEP Rough Installations**	**07/19/27**	**07/30/27**
• **Area 'A' GWB / Paint / ACT Grid**	**07/19/27**	**07/30/27**
• **Area 'B' GWB / Paint / ACT Grid**	**08/02/27**	**08/13/27**
• **Area 'A' MEP Final Fixtures / ACT & Finishes**	**08/02/27**	**08/17/27**
• **Area 'B' MEP Final Fixtures / ACT & Finishes**	**08/06/27**	**08/20/27**
• **Substantial Completion**		**08/25/27**

EUFSD Phase 5A – Waverly School	**Start**	**End**
• **Boiler Room Work / Start Up**	**05/17/27**	**07/09/27**
• **RTU / Chiller Installation / Start Up**	**06/25/27**	**08/04/27**
• **Transformer Installation / ConEd Connection**	**06/25/27**	**07/16/27**

Work hours will vary:

1. During Summer and School Vacation Times: Contractor will have access to the site during regular first-shift hours. Access to other areas will be coordinated and approved by the Owner and Construction Manager.

2. During School Hours: Contractor may access the site and staging area only during regular first-shift hours. However, access to occupied areas during the school day is strictly prohibited. If work in occupied spaces is necessary, it must be conducted after school hours during a second shift. Contractor must include second shift work in their base bid. No work will be permitted during school testing and/or Regents exams. While specific dates have not been determined, contractors should account for five (5) non-working days.

Other Provisions:

1. All Work required by any of the Owner's representatives and consultants, including the Construction Manager, Architect, Architect's consultants, Owner's Attorneys, etc., to execute final the contract beyond Milestone dates, or to execute final closeout after 30 days past substantial completion, if determined to be caused by Contractor, shall result in payment(s) to the Owner for additional services to the Construction Manager, Architect, Architect's consultants, Owner's Attorneys, etc. These costs will then be issued in the form of a Deduct Change Order to the Contractor's contract at the Owner consultant's contractual rate.
2. Due to space limitations at the jobsite, all Contractors are specifically notified that jobsite material lay-down areas will need to be relocated as necessary. All contractors are required to comply with Construction Managers direction and sequencing.
3. Any additional costs incurred by the owner's representatives, including the Construction Manager, Architect, Owner's staff, Owner's consultants and any related costs, due to schedule overruns beyond the milestone dates, if determined to be the contractor's responsibility, will result in a deduct change order at the contractual rate established by the Owner or their representatives.

4. Enough workforce shall be provided at all times to maintain progress of the job. A shortage of labor in the industry shall not be accepted as an excuse for not properly staffing the job.

5. The objective of this project is to complete the overall work in the shortest duration of time. Thus, if access is provided to a work area sooner than originally scheduled, each contractor will likewise mobilize their forces earlier to maintain the reduction in overall schedule time.

6. Contractor is advised that “Time is of the essence” as per the General Conditions of the Contract and they will work with multiple crews of sufficient size as necessary to carry out the work with the utmost speed with good workmanship. If the contractor fails to expedite and pursue any part of the work, the Owner may order the contractor to take “Extraordinary Measures” or hire others to complete the work and adjust their contract amount accordingly as per the General Conditions.

7. Contractor is specifically notified that they must properly staff the project with a competent field superintendent and a sufficient supply of workers to maintain progress and flow of the work as required by the schedule, and to coordinate/install in a timely manner to facilitate the work of other trades.

8. All trades are hereby informed that construction will proceed in phases, requiring temporary disconnection, reconnection, and maintenance of utilities and services as needed. It is imperative to ensure uninterrupted use of essential services (such as mechanical, electrical, fire alarm, and public address systems) to all occupied areas throughout the project.

END OF SECTION 011100

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012100 – ALLOWANCES

1.01 WORK INCLUDED

A. The Contractor shall provide all labor, materials, equipment and services so as to perform all work of this section and related work indicated on the Construction Drawings and as specified herein, including, but not limited to, the following:

B. Inclusion of the Allowances herein.

C. In addition to the work indicated on the Construction Drawings and elsewhere in this Project Manual and specification, the Contractor shall perform additional work as may be ordered by the Owner's Representative, Owner, or Architect.

D. The following amounts are for any additional work as may be required or ordered by the Owner, Owner's Representative, or Architect or required due to field related conditions. Any additional work relative to these allowances will be authorized and instituted through the Change Order process. Any unused portion in whole or in part of the allowance shall be refunded to the Owner, also through the Change Order process.

E. The Contractor's costs for unloading and handling at the site, overhead, profit and other expenses contemplated for the stated allowance amounts shall be included in its contract sum and not in the allowances.

1.02 RELATED WORK

A. Refer to the related and associated divisions of the Project Manual and Specification for related additional or supplementary details and information.

1.03 CONTRACT DOCUMENTS

A. Applicable provision of the Conditions of the Contract shall govern all work under this section.

1.04 ALLOWANCES

A. **The General Contractor shall include in Base Bid 1 the sum of Eighty Thousand Dollars ($80,000).**

B. **The HVAC Contractor shall include in Base Bid 1 the sum of Forty Thousand Dollars ($40,000).**

C. **The Plumbing Contractor shall include in Base Bid 1 the sum of One Hundred Thousand Dollars ($100,000).**

D. **The Electrical Contractor shall include in Base Bid 1 the sum of Forty Thousand Dollars ($40,000).**

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012300 – ALTERNATES

1. GENERAL REQUIREMENTS

A. Each Contractor shall state in its Proposal the amount to be added or deducted from his Base Bid for the difference in cost between the work described under each Alternate and the corresponding work specified under the Base Bid.

B. Owner may determine the lowest bid by adding one base bid to other base bid(s) and/or by adding to or deducting from those base bid(s), additive or deduct alternates, or substitutions, if any, which the Owner elects to accept after the opening of bids.

C. Alternate bids shall reflect the increase or decrease in cost of all work of every nature which may be affected thereby, and no subsequent claims for extras by reason of the Contractor's failure to observe this requirement will be considered.

D. Except as otherwise described or approved, material and workmanship required by the Alternates differ from the requirements shown on the drawings or specified for corresponding items, the Alternate's construction and materials will be subject to the approval of the Architect.

E. Submit shop drawings and samples of the work under each accepted Alternate as per "General Conditions" requirements.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012600 – CONSTRUCTION PHASE CLARIFICATIONS REQUESTS FOR INFORMATION FROM ARCHITECT'S OFFICE

PART 1 – GENERAL

1.01 SUBMISSION OF ARCHITECT'S RFI FORM:

A. In addition to the requirements of General Conditions of the Contract for Construction and the Supplementary General Conditions of the Contract, each Contractor shall comply with the following wherever it applies to the work of his contract:

1. Each Contractor shall prepare and submit, on the Architect's attached form (see last page of this specification section), an original Request For Information (RFI) to Architect's Office, for all questions which may arise during post-bid award activities which are to be directed to the office of the Architect. This form shall be submitted before commencement of any work, which may be in question. (Commencement of work in question shall constitute complete acceptance of field conditions and necessary remedial repairs as directed by the Architect, and work shall be conducted at no additional charges to the Owner.) The RFI form shall indicate, at the bare minimum, the following information:

a. Date of Request and RFI number.

b. Project Name and Project Number: reflecting title sheet information, including SED number.

c. Attention of: Name of Architect in Charge/Project Director/Project Manager.

d. From: Name of submitting Contractor representative, including his project title, office or field office phone number, email address and fax number.

e. Trade: The Contract, which is being represented.

f. Date Information Required By: Fill in exact date information is required. "ASAP" or "IMMEDIATELY" will not be acknowledged by the Architect's office.

g. Detailed description of requested item.

2. Note to the Contractors: Request For Information forms shall be used for requests, clarifications, or questions on contract drawings and specifications, not contract terms, scheduling items, or general correspondence, or as a means to describe or request approval of alternate construction means and methods, concepts, substitutions, materials, or systems. Each individual Contractor is to fill out the Architect's RFI form completely (leaving no blanks) and send them DIRECTLY via fax to the Architect's Office, with a concurrent copy to the Construction Manager's office; if applicable. Neither the Architect nor the Construction Manager, if applicable, will be filling out these forms on your behalf, but they will be working with each other and the Owner to answer such RFIs. Incomplete RFI forms will not be logged in, and will be discarded. It shall not be the Architect's responsibility to contact any Contractor submitting RFIs to verify their completeness or accuracy.

B. RFI Log: Each Contractor shall be responsible to generate an RFI log, to be updated and submitted weekly to the Architect and the Construction Manager, if applicable. Examples of acceptable log format can be obtained from the office of the Owner's Representative or the Construction Manager, if applicable. Log shall include, at bare minimum, the following items:

1. Date of submittal to Architect's office, and method of transmittal.

2. Date of response from Architect's office.

3. If not yet responded to, number of days since submittal.

4. In Contractor's opinion, list of affected trades impacted by the results.

1.02 LIMITATIONS:

A. Requests for information shall be made in full accordance with General Conditions of the Contract for Construction. The Architect agrees to the following actions with regard to "Requests For Information" which are received by his office:

1. The Architect shall review properly prepared, timely requests by the Contractor for additional information about the contract documents. A properly prepared Request for Additional Information about the Contract Documents shall be in a form prepared or approved by the Architect, and shall include a detailed written statement that indicates the specific drawings or specifications in need of clarification and the nature of the clarification requested.

2. If deemed appropriate by the Architect, the Architect shall, on the Owner's behalf, prepare, reproduce, and distribute supplemental drawings and specifications in response to Request For Information by the Contractor.

   a. The Architect shall interpret and decide matters concerning performance of the Owner and Contractor under, and requirements of, the contract documents on written request of either the Owner or Contractor. The Architect's response to such requests shall be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

3. Based upon the amount of RFIs received, and their content, unless otherwise so indicated on the RFI, the Architect shall establish the level of importance of said RFIs, and shall be allowed sufficient time in the Architect's professional judgement to permit adequate review. Prior to submitting any RFIs, each Contractor shall use their individual discretion in determining whether or not an RFI format or verbal format be used to resolve said situation.

4. In the event of multiple sequential RFIs received same day at the Architect's office, unless they are specifically numbered by the Contractor for their order of relative importance, they will be reviewed either: a) in the time order in which they were received by the Architect's office, b) in their natural progressive order of construction placement, or c) in order of preference, as determined by the Architect.

5. As a result of multiple sequential RFI submission, no delays in time, or Contractor hard or soft costs shall be implied or imposed onto the Architect. It is the Contractor's complete responsibility to adhere to the prepared Construction Schedule at all costs, including extended delays, which may be incurred by time required for RFI responses from the Architect's office.

6. Should an answer be required 'immediately', the Contractor shall simply place an asterisk by the date required to call attention to such a fact. He shall coordinate his own work forces accordingly to allow the Architect proper review and analysis time for resolution of such 'immediate' problems.

7. It shall be the Contractor's complete responsibility to document any verbal responses, into either follow-up RFI submittals or formal letters (on company logo stationery) to the Architect's office. Upon receipt, the Architect will review and make modifications to the correspondence if it varies in content from the Architect's interpretation. This will eliminate confusion or misunderstandings made in verbal form.

8. The Architect shall be the sole interpreter of all RFI validity, as the RFI is based on products of service produced by the Architect's office. The Architect reserves the right to reject any and all RFIs deemed frivolous or trivial.

9. As work in question is directed to the Architect for his sole response, only the attached Architect's RFI form will be considered as final and binding.

1.03 LOG-IN PROCEDURE FOR ALL RFI REQUESTS

A. Log-in procedures are based on the normal business hours of the Architect's office, and ***will not be modified for any reason***. The Architect's normal business hours are 8:00 a.m. to 5:00 p.m., EST, Monday through Friday***. All RFIs shall be reviewed by the Architect's office during normal business hours***. The Architect's office is closed on the following legal holidays: New Year's Day, President's Day, Memorial Day, Labor Day, Thanksgiving Day and the day following, and Christmas Day. ***Under no circumstances shall the Architect's office be considered or assumed as open for business on Saturdays, Sundays, or legal holidays***.

B. Any RFIs, which are received between 8:00 a.m. and 2:59:59 p.m. on a normal business day, will be received and logged in as received on that business day. Any RFIs, which are received and logged in by the Architect's Office at 3:00 p.m. or later (Eastern Standard Time) on a normal business day shall be considered as received at 8:00 a.m. the following business day. Any RFIs received by the Architect's office at or after 3:00 p.m. on Fridays will be logged in as received at 8:00 a.m. on the next following business day (Monday), In the case of the following calendar day being a holiday, the RFI shall be considered as received on the next non-holiday business day at 8:00 a.m. ***All receipt times shall be as determined by the received time stamped and signed in by the Architect's office***.

1.04 PROPER SEQUENCING OF RFI SUBMISSIONS

A. It is the Contractor's sole responsibility to fully coordinate submission of RFI forms with shop drawing and technical data submittals made or yet to be made. The Contractor must coordinate each RFI with requirements of work and the contract documents.

B. The Contractor's responsibility for deviations in submissions from requirements of contract documents is not relieved by Architect/Engineer's review of RFIs or associated submissions, unless the Architect gives written acceptance of specific deviations.

C. The Contractor's responsibility for errors and omissions in submissions or RFIs is not relieved by the Architect's review of submissions or RFIs.

D. In conformance with Section 013300 – Submittal Procedures, notify the Architect in writing at time of shop drawing/technical data submission of deviations in submissions from requirements of contract documents. Do not wait until RFI is prepared to inform the Architect's office of planned deviations.

E. Similar to Section 013300 – Submittal Procedures, no portion of the work requiring RFI clarifications shall be started, fabricated, or installed until return of Architect's formal response, including any supplemental information the Architect deems relevant for clarification.

F. After response to RFI, the affected Contractor shall distribute copies of the RFI responses to all parties requiring same for coordinating all subsequent work. The Architect's only responsibility shall be to supply one copy of each RFI resolution to: the Construction Manager, if applicable, the Owner, and the affected Contractor who initiated the RFI.

G. The affected Contractor shall make required copies of all RFI resolutions for distribution to all affected parties immediately upon receipt and review of same.

1.05 AFFECT OF RFI RESPONSES ON THE CONTRACTOR'S CONSTRUCTION SCHEDULE

A. All Contractors shall note well that the Architect is not legally bound to their approved construction schedules; the Contractors are the only parties legally bound therein. The Architect is not required to expedite any reviews or comments in the effort to expedite the Contractors' submission and/or construction schedules. Therefore, time delays created by the Architect's required review time of each RFI shall be absorbed into the Contractor's work schedule accordingly. This may necessitate such Contractor measures as: multiple work crews, off-hour or weekend construction by the affected Contractor(s), to be completed at no additional costs to the Owner. For this reason, it is imperative that each Contractor carefully review all documents as early as possible, in order to issue RFIs by the earliest possible date.

B. Any RFIs which are relative to an alteration, to the approved contractual details, or specifications will be specifically referred to the Architect's office with relative time differences noted. Any additional time required for alterations, if RFIs are approved, shall have all additional costs (if any) absorbed directly by the Contractor affected. ***Should other Contractors be directly affected in either labor, material, or equipment costs, their additional costs shall be borne by the Contractor who initiated the RFI***.

1.06 AFFECT OF RFI FORMS ON CONTRACTOR PREPARATION, AND PREPARATION OF SHOP DRAWINGS, SAMPLES, MANUFACTURER'S DATA, ETC.

A. It is the responsibility of the Contractor furnishing and/or installing materials and/or systems to these projects to field verify all existing and/or as-built conditions, as well as all conditions presently under construction that are interrelated in whole or in part to the furnishing and/or installing of such materials and/or systems. Submissions of RFI forms are at the sole discretion of each Contractor.

B. It is the responsibility of each Contractor to coordinate such field verification and be ultimately responsible for the accuracy of same prior to the submission of any RFI forms or shop drawings for design intent review by the Architect/Engineer.

C. Similar to submittal information indicated in Section 013300 – Submittal Procedures, all RFIs initiated by any subcontractor and/or supplier of the Contractor and/or supplier of the Contractor or by the Contractor themselves shall be reviewed by and shall be deemed officially submitted by the Contractor. All RFIs shall be thoroughly checked by the Contractor prior to the submission of same to the Architect's office for: contract document accuracy, validity and/or equivalency (if applicable); total quantity of material provided; all dimensioning systems related; alteration to same if necessary to accommodate accepted field changes built or pending; interaction with other materials and/or systems furnished and/or installed by this Contractor or their subcontractors (i.e., field measurements for space allocation, accuracy to previous submittals of this Contractor, etc.); and interaction with materials and/or systems provided by other Contractors.

D. After the completion of applicable RFIs, when submitting subsequent revised technical data or revised shop drawings, the Contractor shall signify same on subsequent submittal by having the following information on each and every submittal:

- Name of Contractor
- Date of Review by Contractor
- Note: This submittal has been reviewed by (Name of Contractor) in accordance with the contract documents describing and defining the requirements of such review, with affected RFI number attached.
- Copy of approved RFI, indicating Architect's final comments.
- Signature of Contractor's reviewer.
- Name of Contractor's reviewer (printed).
- Title of Contractor's reviewer (printed).

E. The Contractor shall submit in writing to the Architect and Construction Manager, if applicable, prior to their relevant revised or initial submissions, the name and title of the reviewer who shall be an employee of the Contractor for review and acknowledgment of same, along with the recommended RFI from the Architect's office.

F. If this project has a Construction Manager who is acting on the Owner's behalf and who has full-time construction site representation, the scheduling of all RFIs, submissions, the coordination, and interaction of other contractors, field conditions that affect the submission of, fabrication of, or installation of another Contractor's submission, fabrication, or installation shall be made known to the Owner's Representative. Refer to Section 013300 – Submittal Procedures for additional relevant information.

G. Any resultant construction field condition that arises that is contrary to an RFI or submission made, that is conflicting with another Contractor's submission, the schedule for construction, or with another Contractor's constructed work shall be immediately identified by the Contractor(s) and made known to the Owner's Representative. If such condition causes any construction schedule delay, "rereview" by the Architect/Engineer, additional work of the Architect/Engineer (such as field review, "redesign" or document preparation); or "reconstruction" of any work already built and/or accomplished by another Contractor, the connection to such conditions (and any associated costs to accomplish same) shall be the sole responsibility of the Contractor found negligent in causing such conditions.

H. Any RFI not containing complete information outlined and required as indicated within the above subsections will not be reviewed by the Architect for design intent, but rather rejected and discarded, so all Contractors must insure that no blanks are left on their submitted RFIs. All time lost as a result of this error will be the sole responsibility of the Contractor who made the error.

I. Any RFI submitted by the Contractor that requires subsequent coordination with another material and/or system provided by this Contractor or another Contractor that has been reviewed, by that Contractor and previously submitted to the Architect may be rejected in whole or part by the Architect, or held in abeyance by same until the corresponding and coordinating submittals are submitted as the concurrent review of all such submittals for design intent, may be deemed important by the Architect. Any release given any entity other than the Architect to fabricate, furnish, and install any material or system not reviewed by the Architect for design intent shall become the sole responsibility of the releasing entity as well as the resolution of construction related issues or conflicts, relative to approved or disapproved RFIs.

J. In addition, the Contractor shall not utilize nor refer to any schedule of work not created nor provided by the Architect. The Contractor's method in establishing, defining, and/or substantiating their ability to maintain the schedule presented in these contract documents and as prepared by the Owner's representative shall be exclusive of a defined time period of submittal review, and shall not be dependent upon RFI approval or time delays incurred.

K. Similar to Item 1.09L of Section 013300 – Submittal Procedures, the rejection or abeyance noted in the above subparagraph shall not be considered a delay or a reason for an extension of time in the construction schedule to the contract, as such cause for same shall have been brought upon by the Contractor not providing the "pre-coordination" necessary for such submissions.

PART TWO – PRODUCTS

Not Applicable.

PART THREE – EXECUTION

Not Applicable.

END OF SECTION

BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

244 EAST MAIN STREET | PATCHOGUE | NEW YORK 11772 | T. 631.475.0349 | F. 631.475.0361
187 WOLF ROAD, SUITE 205 | ALBANY | NEW YORK 12205 | T. 518.621.7650 | F. 518.621.7655
www.BBSARCHITECTURE.COM

REQUEST FOR INFORMATION

RFI No.:	
Date:	

Project:		BBS Project No.:	
Location:			
To The Attention of :			
Company:		**Requested BY:**	
Trade:			
Phone:		**Fax:**	
Date Information Required By:			

Description:	**Spec Section/ Dwg:**

Reply:

BY:	**FIRM:**	BBS Architects, Landscape Architects & Engineers, P.C.	**DATE:**

If a "Request for Information" is deemed relevant and appropriate by the Architect, the Architect's response to such requests shall be made in writing within any time limits agreed upon or otherwise with reasonable promptness. Upon evaluation of the Prime Contractor's request and if deemed necessary, the Architect's response may include supplemental drawings and specifications.

SECTION 012600 – CONTRACT MODIFCATION

PART 1 – PROCEDURES - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.
   1. The provisions of this Section apply to the work of prime contractor.
B. Related Sections: the following Sections contain requirements that relate to this Section:
   1. Division 1 Section “Submittals” for requirements for the Contractor’s Construction Schedule.
   2. Division 1 Section “Applications for Payment” for administrative procedures governing Applications for Payment.
   3. Division 1 Section “Substitutions” for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect’s Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or reviewed Drawings and Specifications. The Architect will Use AIA Document G709 for Change Order Proposal Requests.
   1. Proposal requests issued by the Architect are for information only. Do not consider them as instruction to stop work in progress or to execute the proposed change.
   2. Within 5 days of receipt of a proposal request, submit an estimate of the cost necessary to execute the change to the Architect for the Owner’s review.
      a. Include an itemized list of quantities of products required and unit costs, with the total amount of purchases to be made. Furnish survey data and backup invoices, quotes paperwork to substantiate.
      b. Separate labor hours by trade and indicate labor rate. (Submit attached labor rate worksheet notarized for each trade / classification.)
      c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      d. Include an updated Contractors Construction Schedule that indicates the effect of the change, including but not limited to; changes in activity duration, start and

finish times, and activity relationship. Use available float before requesting an extension of contract time.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect with copy to the Construction Manager.
   1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
   2. Include an itemized list of quantities of products required and unit costs, with the total amount if purchases to be made. Furnish survey data to substantiate quantities. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts. Include labor rate breakdown sheets for each trade.
   3. Comply with requirements in Section “Product Substitutions” if the proposed change requires substitution of one product or system for a product or system specified.
   4. Include detailed substantiation that indicates the effect of the change, including but not limited to; changes in activity duration, start and finish times, and activity relationship. Use available float before requesting an extension of contract time.

1.5 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
   1. Include installation costs in the purchase amount only where indicated as part of the allowance.
   2. When requested, prepare explanations and documentation to substantiate the margins claimed.
   3. Submit substantiation of a change in scope of work claimed in the Change Orders related to unit-cost allowances.
      Separate labor hours by trade and indicate labor rate. (Submit attached labor rate worksheet notarized for each trade / classification.)
   4. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.
   5. **The contractor's overhead and profit, along with all costs related to bonds and insurance, must be incorporated into the general requirements of the contract sum and cannot be charged against any allowance disbursements. Supervision costs will only be reimbursed if the work takes place outside the superintendent's regular on-site supervision hours.**

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor’s handling, labor, installation, overhead, and profit. Submit claims within 15 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 15 days.

1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714/CMa. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect or Construction Manager will issue a Change Order for signatures of the Owner, Architect, Construction Manager, and the Contractor on AIA Form G701.

B. No Change Order or Allowance requisitions can be made or listed on the requisition, unless the formal Change Order or Allowance Disbursement paperwork has been fully executed by Contractor, Construction Manager, Architect, and Owner.

C. Requests for changes in bond fees, if any, will be analyzed at the conclusion of the project. Contractor's bonding company to submit substantiation letter. (Bond amount based on total adjusted contract value)

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)



Arris Contracting Company, Inc.
189 Smith Street
Poughkeepsie, NY 12601

LABOR RATE WORKSHEET

Project No. _____

Contractor Name: _____ County: _____ Date: _____
Address: _____
Telephone Number: _____

Trade: _____
(Provide separate sheet for each trade, foreman/journeyman, etc.)

	*	% per hour	$ per hour	REGULAR BASE RATE	PREMIUM TIME BASE RATE
A. WAGE RATE PER HOUR					
BENEFITS (* Identifies benefits paid directly to the Employee.)					
Vacation and Holiday					
Health and Welfare					
Pension					
Annuity					
Education / Apprentice Training					
Supplemental Unemployment					
Security Fund					
Industry Advancement					
UBC-Appr., Health, Safety, Educ.					
Labor Management Fund					
B. TOTAL BENEFITS PER HOUR					
PAYROLL TAXES AND INSURANCE					
F.I.C.A. / Social Security (up to the maximum required by law)			%		
Medicare			%		
Federal Unemployment (up to a maximum of $56.00 per employee per year)			%		
State Unemployment (up to 1st $8,500 of base salary paid per employee per year)			%		
Workers' Compensation Code: _____			%		
Disability			%		
C. TOTAL TAXES AND INSURANCE PER HOUR					
All Benefits are paid directly to Employee. _____ x _____ % =					
Only benefits identified by * are paid directly to Employee.					
D. TOTAL LABOR RATE (A + B + C) =					

E. DOCUMENTATION

For General Liability and Workers Compensation, provide policy renewal page from insurance carrier (with contractor name, address, and insurance agent) for substatiation purposes.

F. CONTRACTOR'S CERTIFICATION

I certify that the labor rates, insurance enumerations, labor fringe enumerations and expenses are correct and in accordance with actual and true cost incurred.

_____
Signature

_____
Print Name of Authorized Representative

_____
Print Title

Sworn before me this _____ day

of _____, 20 _____.

_____
Notary Public

END OF SECTION 012600

SECTION 012900 – PAYMENT PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.
   1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.
B. Related Sections: The following Sections contain requirements that relate to this Section.
   1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 1 Section "Submittals."

1.3 SCHEDULE OF VALUES

A. Coordination: Contractor shall coordinate preparation of its Schedule of Values for the Work with preparation of the Contractors' Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
      a. Contractor's Construction Schedule
      b. Application for Payment forms, including Continuation Sheets
      c. List of subcontractors
      d. Schedule of allowances
      e. Schedule of alternates
      f. Schedule of submittals
   2. Submit the Schedule of Values (SOV) to the Construction Manager within 10 days of receipt of the Letter of Intent but no later than 10 days before the date scheduled for submittal of the initial Applications for Payment. (SOV's received after the 15th of the month, will not be allowed to requisition until the following month, due to input time for CM & Owner into their computer systems).
B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one-line item for each Specification Section.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name of the Architect.
      c. Project SED number.
      d. Contractor's name and address.
      e. Date of Submittal
   2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of Work.

c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.
    1. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items as requested by the Construction Manager. Multiple line items will be provided for amounts in excess of five percent of the contract sum, broken out into subcomponents equaling not greater than five percent each. Separate all line items by material & labor.
    a. Breakdown shall be separated between additions, renovations and sitework with subtotals for each.
    b. Breakdown will be separated by school (and SED number) each with its own stand-alone front-end sections as outlined in item 4 below. Each will have their own subtotal, so that the owner can easily see the value to date with needing to add columns.
4. In addition to the breakdown of specification sections, separate line items will be required for the following front-end line items:
    a. Bonds & OCP insurances shall be listed as separate line items. (Substantiation letters required from bonding & insurance company for any amount higher than industry standard of 2.0% of contract sum). Only OCP insurance is allowed for insurance line item. All other insurance costs must be distributed by contractor evenly throughout the various sections.
    b. Supervision – include a minimum of 1% of contract sum.
    c. Project Administration – include a minimum of 1% of contract sum.
    d. Project meetings (appropriate value for weekly attendance for entire duration of project – see Section 01 31 19 Project Meetings for amount)
    e. Punchlist – include a minimum of 2.5% of contract sum
    f. Closeout: separate lines for demobilization, Operation & maintenance manuals, closeout paperwork, demonstration & training (total for closeout minimum 2% percent of contract value)
    g. Continuous Clean-up and Final Clean-up values each at minimum of 2% of contract sum.
    h. General Contractor to add line item for Broom sweep/damp mopping at minimum of .5% of contract sum.
5. Round amounts to the nearest whole dollar; the total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
    a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing.

7. Provide separate line items on the Schedule of Values for the initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents. Allowances to be listed at the end of the Schedule of Values.
9. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
10. Schedule of Values Updating: Update and resubmit the Schedule of Values with the next Applications for Payment when Approved Change Orders or Executed Construction Change Directives and Approved Allowance Disbursements.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
    1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
B. Payment Application Times: Each progress-payment date is indicated in the Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
C. Payment-Application Times:
    1. Submit the initial Payment Application to the Construction Manager and the Architect by the twenty fifth of the month for that month. The Construction Manager and the Architect will provide final comments within three business days of receipt on the twenty fifth of the month. If submitted later than the twenty fifth of the month, review times may be as long as five days from receipt.
    2. All required documents, including the final version of the Application for Payment, based on the comments provided by the Construction Manager and the Architect, must be received by the Construction Manager no later than the first business day of the month following the twenty fifth due date. This will allow for final review by the Construction Manager for accuracy and completeness of submitted documents. If comments are provided to the contractor, the contractor must submit a new complete package including all required corrections/updates.
    3. All final, complete, Payment Applications will be transmitted to the Owner on the 5th day of the month. Payment will be in accordance with the terms of the General Conditions of the Contract for Construction.
    4. If a complete package is not submitted to the Construction Manager by the fifth of the month, they will be paid as per the terms of the Standard Form of Agreement Between Owner and Contractor.

D. Payment-Application Forms: Use AIA Document G732/CMA (provide a line for the Construction Manager's signature) and Continuation Sheets G703 as the form for Applications for Payment.
   1. Separate Continuation Sheets shall be provided for work which takes place on each building and per NYSED project number indicated on drawings and specifications, which will detail that portion of the contract which is attributable to the specific building and NYSED project number indicated on drawings and specifications.

E. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Construction Manager will return incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions are made.
   2. Include amounts of Change Orders and Allowances issued prior to the last day of the construction period covered by the application. (No Change Order or Allowance requisitions can be made or listed on the requisition, unless the formal CO/AD paperwork has been fully executed by Contractor, Construction Manager, Architect, and Owner).
   3. Provide digital copies of payrolls which are signed and notarized (Blue Ink) documenting compliance with prevailing wage laws. Payroll for contractors is required from the 25th of the previous month to the 24th of the current month. Payroll for subcontractors is required from the 15th of the previous month to the 14th of the current month.
   4. Provide copies of lien waivers for the previous payment (or anticipated payment.) Include certificate of monthly payment for subcontractors for the previous month.
   5. Provide OSHA 10 certificates for all workers on site.
   6. Payment for stored materials (whether onsite but not installed, or offsite in a secure warehouse) will require a bill of lading showing the exact value and photographs. In no case shall more than 90% be approved for uninstalled stored materials. An insurance certificate must be provided, specifically to the materials stored with the appropriate dollar value (for onsite or offsite materials).

F. Transmittal: Submit 1 signed and notarized digital copy (blue ink signature) of each Application for Payment to the Construction Manager by a method ensuring receipt within 24 hours. The digital copy shall be complete and attached as a single file to include all waivers of lien, certified payrolls and similar attachments.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect and Construction Manager.

G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.
   1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   2. When an application shows completion of an item, submit final or full waivers.
   3. The owner reserves the right to designate which entities involved in the Work must submit waivers.

a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

4. Waivers Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following. The initial payment application will not be processed until all of these actions and submittals have been received by the Construction Manager. When preliminary submissions are received with the initial application (items 4 and 7), the final submission for these items must be received and approved by the Construction Manager prior to submission of the second application for payment.
   1. List of subcontractors.
   2. List of principal suppliers and fabricators
   3. Schedule of Values.
   4. Contractor's Construction Schedule (preliminary if not final).
   5. Schedule of principal products.
   6. Schedule of unit prices.
   7. Submittal Schedule (preliminary if not final).
   8. List of Contractor's staff assignments.
   9. Certificates of insurance and insurance policies.
   10. Performance and payment bonds.
   11. Data needed to acquire the Owner's insurance.
   12. Initial settlement survey and damage report, if required.

I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
   1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   2. Administrative actions and submittals that shall precede or coincide with this application include:
      a. Occupancy permits and similar approvals.
      b. Warranties (guarantees) and maintenance agreements.
      c. Test/adjust/balance records.
      d. Maintenance instructions.
      e. Meter readings.
      f. Startup performance reports.
      g. Changeover information related to Owner's occupancy, use, operation, and maintenance.
      h. Final cleaning.
      i. Application for reduction of retainage and consent of surety.
      j. Advice on shifting insurance coverages.
      k. Final progress photographs.
      l. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

J. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
   1. Completion of Project closeout requirements.
   2. Completion of items specified for completion after Substantial Completion.
   3. Transmittal of required Project construction records to the Owner.
   4. Removal of temporary facilities and services.
   5. Removal of surplus materials, rubbish, and similar elements.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 No retainage release will be approved by owner until all closeout documents (Closeout paperwork, as-builts, O&M manuals, AIA release forms, warranties, material turnover receipts, etc.) are received and verified complete.

END OF SECTION 012900

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013000 – SPECIAL PROCEDURES AND PROVISIONS

PART 1 - GENERAL

1.01 CONTRACTOR'S SUPERINTENDENT

A. The Contractor must devote his time and personal attention to the work and shall employ and retain at the building from the commencement until the entire completion of the work a Contractor's Superintendent competent and capable of maintaining proper supervision and care of the work and acceptable to the Architect, who, in the absence of the Contractor and irrespective of any superintendent or foreman employed by any Subcontractor, shall see that the instructions of the Owner are carried out.

B. The Contractor shall employ a competent senior superintendent. Such superintendent may not be replaced during the duration of the Project, including the completion of Punch List, unless approved by the Architect.

C. The Contractor is to provide a resume of the Contractor's Superintendent to the Owner's Representative.

D. The Contractor shall, at all times during the work, have a representative on site who communicates in English.

1.02 REPAIRING

A. The Contractor shall do all repairing of work that becomes damaged by his workmen or the workmen of any of his subcontractors during the progress of his work or prior to its acceptance.

B. All existing work that is damaged or disturbed during the alteration and finish work to the building shall be left in the condition as originally found.

C. Any exterior areas damaged or disturbed by work of this Contract shall be properly repaired and left in sound condition and the premises shall be left clean and orderly.

1.03 CONTRACTOR'S RESPONSIBILITY

A. The Contractor will be held responsible for all work and materials provided for by the plans and specifications until the work is completed and accepted. The Contractor will be held responsible also for any and all damages which may arise or occur to any party whomsoever by reason of work of this project, delivery and storing of materials, the opening or blocking of streets and walks or by neglecting to provide proper lights, guards, barriers, any other safeguards to prevent damage to property or injury to persons.

B. Where openings cause exposure to outside elements, the Contractor shall provide necessary protection and coverings to prevent damage from frost or water.

C. Provide and maintain temporary dustproof partitions to enclose spaces used by the Owner and relocate as required. Remove when no longer needed.

D. The Contractor assumes responsibility for all injury to or destruction of or loss by theft or pilferage of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form of work and personal property of his employees regardless of the cause.

E. Each Contractor shall be responsible for their own material and equipment until completely installed, inspected for completeness and correctness, and signed off by the Architect or his duly appointed representative.

F. The Contractor shall provide written guarantee of the complete installation to be free from defects in materials and workmanship in accordance with Section 017000. Any portion of the work judged inferior shall be replaced by the Contractor at no additional cost to the Owner.

G. The cost/value of required repair/replacement of any non-conforming items as documented by the Architect's subject to inclusion in the Architects "Record of Unacceptable or Non-Conforming Work" and will be the subject of a fixed dollar amount of credit due to the Owner, prior to project closeout in enforcement of AIA Document A201, Item 12.3, "Acceptance of Non-Conforming Work". If the contractor delays resolution of non-conforming work, the fixed dollar amount of credit is subject to a proportional cost increase at the discretion of the Architect.

H. The Contractor shall maintain operational exits, exit lights, danger signs, open trench markings, fire emergency equipment, night lights, and proper storage facilities for equipment and materials as directed through the length of the contract.

I. The Contractor shall take over and maintain the site immediately after receiving the order to start work. Provide protection of property and utilities until work of the Contract is complete and accepted. The Contractor shall be responsible for the safety of any adjoining property, including paving, utility mains, pipes, conduit, etc., and shall, at his own expense, protect and maintain same in at least as good a condition as that in which they were found.

J. All seeded areas, pavements, walks, curbs, and approaches shall be kept clear at all times and, if disturbed by this construction work, shall be repaired and restored with materials to match existing.

K. Before commencing any work, the Contractor shall verify all dimensions, coverage and conditions prevalent at the job sites. If discrepancies are found, the Contractor shall report all discrepancies in writing. If no corrections are brought to the attention of the Owner and the Architect/ Engineer before starting installation, the Contractor will be totally responsible for the installation providing complete coverage of the area designed as intended by the Architect.

L. For Additions to Existing Buildings: The General Contractor is responsible for correct finish floor alignment between existing building and proposed addition. At each finish floor, General Contractor shall utilize a licensed New York State surveyor to check all finish floor elevations shown for accuracy and shall be responsible for establishing said elevations prior to shop drawing submittal. The General Contractor's submission of steel and or concrete shop drawings shall contain said information and be the final basis for all other established elevations. The architect will accept said elevations as final, as the submission will include a licensed surveyor's certification of same.

M. Upon completion of the work, the Contractor shall furnish as-built drawings showing the exact locations of every new item.

N. It is assumed that Contractor's prices are based on scope of work complete and as confirmed by site(s) inspections prior to bidding.

O. The Contractor shall be responsible for all incidental electric and plumbing work required to complete work under this Contract.

P. The Contractor shall be required to conform to all OSHA requirements regarding Lock-out/Tag-out procedures. This shall include, but not be limited to, disconnecting the power to any equipment to be serviced via a disconnect switch or breaker, locking out this power source, and tagging this lockout with appropriate wording as per OSHA requirements. This shall apply to any power source associated with this project.

Q. Safety and Security during Construction Statements: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 2 Items C1 through C5.

R. Additional Requirements of the Contractor:

1. No drinking of alcoholic beverages or use of controlled substances allowed on the grounds. No reporting to work impaired by alcohol or controlled substances is allowed. The Contractor bears the responsibility of determining if its, or its subcontractors, employees are in any way impaired which would jeopardize the safety of the public, the employees of other Contractors and their Subcontractors, the Owner, Architect, and Construction Manager.

2. All Contractors are to refrain from conversing with school personnel and students. Any construction employees found doing so will be removed from the site.

3. All Contractors are to refrain from using indecent language. All doing so will be removed from the site. Art work or decoration found on vehicles belonging to the Contractor's or Subcontractor's employees parked on or near the school property which contain indecent language or pictures shall either be covered or removed from the location.

S. Separation of Construction Statement: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Item E.

1. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs, or elevators designated for students or school staff.

2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

3. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety, and educational capabilities at all times that classes are in session.

T. Fire Prevention: There is no smoking allowed anywhere on school property per New York State law. Violators are subject to a $1,000 fine and/or banishment from the property.

1. Any holes in floors or walls should be sealed with a fire-resistant material.

U. Construction Noise: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item H.

V. Construction Fume Control: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item I.

W. Off-Gassing Control: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item I.

X. Asbestos Code Rule 56: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item K.

Y. Asbestos TEM: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item J.

Z. Lead Abatement Projects: Refer to Specification Section 013500 - Commissioner Regulations (Part 155.5) and Safety Standards – Part 1 - Item K.

1.04 CLEANING

A. Upon completion of all work, the Contractor shall be totally responsible for general site clean up and shall provide all labor and material required to thoroughly "broom clean" the premises throughout. This cleaning shall include, but not be limited to, the removal of all surplus material from all radiators, pipes, ducts, gypsum boards, metal work, woodwork, stairs, floors, ceilings, glass and other material and surfaces, and all surfaces which are finished shall be left in a clean and suitable condition.

1.05 REMOVAL OF TEMPORARY WORKS

A. All temporary work such as guards, shoring, staging, etc., provided or erected by the Contractor shall be removed and shall become the property of the Contractor when such temporary work is no longer required, or when directed, or at completion of the contract.

1.06 MATERIALS, LABOR, TOOLS, WORKMANSHIP

A. The Contractor will provide and furnish at his own expense any and all material, labor, scaffolding, tools, implements, molds, models, and cartage of every description necessary or proper to or for the duty and performance of said work and the faithful execution of his contract.

1.07 ORDERING OF SPECIFIED MATERIALS

A. All specified materials are available from the manufacturers and some items require more time for delivery to the job than others. Therefore, to avoid the necessity of last minute substitutions because of late ordering, it will be the responsibility of the General Contractor to see that items that will require a substantial waiting period before delivery are ordered soon after the Contract is awarded.

1.08 SHUT-DOWNS

A. The Contractor shall perform the work in a manner which will minimize shut-downs of existing operating items or systems. When the performance of the work requires the shut-down of an existing operation item or system, such shut-down shall take place only after the Contractor has given at least five working days notice and has obtained written authorization for the shut-down from the Owner. All shut-downs shall take place only on overtime, at no additional cost. This provision shall apply to all work, including testing of newly installed or altered systems.

1.09 DELIVERIES AND STORAGE

A. All deliveries of materials or equipment must be done in conjunction with the Owner's representatives, to insure the least disruption of the facility. Storage of all materials must be approved by the Owner prior to delivery. The Owner will not accept any deliveries on behalf of the Contractor. A Contractor's representative must be on site to accept such deliveries.

B. Before attempting to deliver materials to the site, the Contractor shall inform the designated Owner’s Representative so that arrangements can be made for places of entrance and inspection of materials being delivered.

C. Storage of materials in the occupied building shall not be allowed unless otherwise agreed upon by the Owner’s Representative. The Contractor shall be responsible for providing all storage trailers and security of same.

1.10 SPECIAL PROVISIONS

A. Contractor Representation at Construction Project Meetings:

1. Each Contractor shall provide qualified representation at all construction project meetings which will be held on a bi-weekly basis for the review of construction progress and coordination of all building trades. Failure of the Contractor to abide by these provisions may cause delays and incur additional expenses due to coordination difficulties.

B. Any existing items (whether or not specified or shown on the drawings) requiring removal in order to properly complete the new work shall be removed by the Contractor performing the work and disposed of off-site at no additional charge to the Owner.

C. Unless a specified item of removal, relocation, or installation (which appears to be in conflict with the actual site conditions) is brought to the attention of the Architect during the bidding period, the Contractor shall be responsible for the execution of said work and any related expenses incurred.

D. Should any work or material be required which is not denoted in the Plans and Specifications, either directly or indirectly, but which is necessary for the proper execution of the intent thereof, it shall be understood and agreed that the same is implied and required and that the Contractor shall furnish all labor and material as if they were completely delineated and prescribed.

E. Should a conflict occur between the drawings and specification and/or existing conditions, the Contractor shall be deemed to have estimated the more expensive way of accomplishing the work unless during the bidding period a clarification was requested by the Contractor and obtained in writing from the Architect, as to which method and material is to be used.

F. Where, in these specifications, one certain kind, type, brand, or manufacture of material is named, it shall be regarded as the required minimum standard of quality and performance. Where two or more are named, these are presumed to be equal and the Contractor may select one of these items. If the Contractor desires to use any other kind, type, brand, or manufacture of material that those named in the specification, he shall submit information describing in detail where it differs from base specifications and other information as required by the Owner.

    1. The burden of proof of equivalence rests with the bidder. Adequate supporting information must accompany proposed substitution. The Owner or Architect reserves the right to accept or reject proposed substitutes.

G. Any item shown on the plans but not specified or conversely specified but not shown on the plans, shall be treated as if shown or mentioned respectively in both.

H. Alignment and adjustment of all erected steel shall be accomplished by a registered professional or land surveyor at the Contractor's expense and to the satisfaction of the Inspector.

I. Inspection of all welded and high strength bolted field connections shall be accomplished by one of the following approved independent testing laboratories or an alternate testing company acceptable by the Owner. The Contractor shall arrange for and the Owner shall pay for all testing other than testing revealing failed results:

    1. All Island Testing.

    2. Soil Mechanics Environmental Services.

    3. Long Island Materials Testing Laboratories, Inc.

J. Unless otherwise noted, each Contractor shall be responsible for their own cutting and rough patching. The General Construction Contractor shall be responsible for all finish patching and painting. All repair and patching work shall be done in a professional manner. The Contractor shall

take care to match new and existing surfaces and materials as closely as possible for a continuous finish where duplication is impossible.

K. Each Contractor shall be responsible for their own material and equipment until completely installed, inspected for completeness and correctness, and signed off by the Architect or his duly appointed representative.

L. The General Construction Contractor shall be the lead contractor, responsible for all coordination between the General Construction, Mechanical, and Electrical trades.

M. The General Construction Contractor shall be responsible for cutting and patching all masonry work, insulated panels, etc. to accommodate any required thru-wall piping, conduit, equipment, or ductwork penetrations by other trades.

N. The General Contractor shall be responsible for provision of any required temporary roof drainage, protective fencing, plywood enclosure of all window and door masonry openings, etc., until new construction or material is permanently and completely in place.

O. The General Contractor shall provide and install all flashing, counterflashing, and pitch pockets for all roof equipment and roof penetrations and install all required roof curbs provided by others in accordance with the manufacturer's approved methods.

P. Changes to the Contract:

1. Should any changes be requested or required over and above the original contract scope, the Contractor shall be compensated as follows:

    a. For the actual and reasonable net costs for all materials and wages of applied labor required for such extra work.

    b. Rental costs for all machinery and equipment (other than small tools) required and approved for such extra work.

    c. 10% overhead and 5% profit as compensation for all other items of profit and cost or expense, including administration, overhead, supervision, etc. (Contractor is limited to 5% overhead for work performed by his subcontractor on changes.)

    d. A maximum of 2% for any increase in bonds and insurance's due to the adjusted contract sum.

Q. As is usual with capital project payments, the Owner will retain 5 percent of each payment issued on verified requisitions for payment submitted by the Contractor. This retainage total will be paid upon satisfactory completion of all work.

R. Contractor's proposals for any additional work (whether a field condition or program change) shall be submitted for consideration as follows:

1. Labor - Number of men
    Wage per hours
    Number of hours

2. Material - Unit costs (no lump sums)
    Unit measure (l.f., s.f., cu.ft., etc.)

3. Rental costs for machine, equipment, driver, etc.

4. 2% for bonds and insurance.

5. Upon request, the Contractor shall furnish satisfactory proof of all labor performed, materials furnished, and equipment used in performance of the extra work.

S. Whenever inclement weather (rain, hail, sleet, snow, etc.) causes an interruption in the day to day execution of the Contract work, each Contractor must fully mobilize their forces (with the necessary manpower and equipment) to immediately continue with Contract operations the very first day that such weather has subsided.

1. Contractor shall provide all necessary excavation and dewatering equipment to remove any standing water from open holes, ditches, trenches, and other excavations.

T. The maximum gross weight of vehicles used shall not exceed 2,500 lbs. per wheel in the area of any playground or ballfields. The equipment shall be fitted with flotation type tires. On lawns, the pounds per square inch exerted on the turf-grass shall not exceed 15 lbs. per square inch and on athletic areas shall not exceed 32 pounds per square inch.

U. See attached “Record of Unacceptable or Non-Conforming Work”.

END OF SECTION

BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

244 EAST MAIN STREET | PATCHOGUE | NEW YORK 11772 | T. 631.475.0349 | F. 631.475.0361
187 WOLF ROAD, SUITE 205 | ALBANY | NEW YORK 12205 | T. 518.621.7650 | F. 518.621.7655

RECORD OF UNACCEPTABLE and NON-CONFORMING WORK DOCUMENT

PROJECT NAME: _____ **LOCATION:** _____ **FILE No.:** _____

OWNER/DISTRICT: _____ **CON MGR or CLERK:** _____ **INITIALS:** _____

CONTRACTOR: _____ **CONTRACTOR REP:** _____ **TRADE:** _____

PROJECT MANAGER: _____ INITIALS: _____ **BBS CONST ADMIN:** _____ **INITIALS:** _____

BBS REVIEW ARCH: _____ INITIALS: _____ **BBS REVIEW ENG:** _____ **INITIALS:** _____

THIS DOCUMENT MAY NOT REPRESENT ALL WORK THAT IS CONSIDERED UNACCEPTABLE OR NON-CONFORMING. IT IS INTENDED TO TRACK SPECIFIC WORK IDENTIFIED TO A CORRECTED CONDITION. THE CONTRACTOR SHALL STILL BE REQUIRED TO MEET THE FULL UIREMENTS OF QUALITY & PERFORMANCE NOTED IN THE CONTRACT DOCUMENTS.

ITEM No.	DESCRIPTION OF DEFICIENT OR UNCOMPLETE WORK ITEMS	INITIALS OF REVIEW REP	DATE INDENTIFIED	WORK CORRECTED OR ACCEPTED AS NON-CONFORMING	INITIALS OF BBS REP/ OWNER/ CONTRACTOR	COST AS DETERMINED BY BBS	COMMENTS

BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

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RECORD OF UNACCEPTABLE and NON-CONFORMING WORK DOCUMENT

Please note that this document will be a running list of Unacceptable and Non-conforming Work for each building and will be issued after each site review if warranted. It is noted by the Architect/ Engineer that the project is on going, the review and decisions will be made with that information in mind. Once the item indicated has been reviewed and approved by the Architect/ Engineer it will be marked as 'Item is Closed' with the date attached.

Section 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1. Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2. Summary

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
  1. General project coordination procedures.
  2. Conservation.
  3. Coordination Drawings.
  4. Administrative and supervisory personnel.
  5. Cleaning and protection.

B. Related Sections: The following Sections: the following Sections contain requirements that relate to this Section:
  1. Division 1 Section “Project Meetings” for progress meetings, coordination meetings, and pre-installation conferences.
  2. Division 1 Section “Construction Progress Schedule” for preparing and submitting the Contractor’s Construction Schedule.
  3. Division 1 Section “Material and Equipment” for coordinating general installation.
  4. Division 1 Section “Closeout Procedures” for coordinating contract closeout.

1.3. Coordination

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection and operation.
  1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  3. Make provisions to accommodate items scheduled for later installation.
  4. Contractor is required to coordinate with their subcontractors, other Prime Contractors and the Construction Manager, sufficiently ahead of the work progressing.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining specials procedures required for coordination. Include such items as require notices, reports, and attendance at meetings.
  1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  1. Preparation of schedules.
  2. Installation and removal of temporary facilities.
  3. Processing of submittals and photocopying/delivery to affected contractors.
  4. Progress meetings
  5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
  1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the work.

1.4. Submittals

A. Coordination Drawings: Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components. (e.g. - sub slab piping, ceiling spaces, etc.)
  1. Show the relationship of components shown on separate Shop Drawings.
  2. Indicate required installation sequences.
  3. Comply with requirements contained in Section “Submittals.”
  4. Contractor will begin coordination drawing process within 15 calendar days of award of Contract by providing ¼” scale drawings indicating locations of all ductwork layout, piping layout, Bottom of duct etc. Contractor shall complete their review and mark-ups within 5 days.
  5. A coordination meeting with Contractor and subcontractors to review completed coordination drawings will be held within 45 days of Contract award.

B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
  1. Electronic CAD Files of Project Base Plan Drawings; May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
  2. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
    a. Use of files is solely at receiver’s risk. Architect/Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Document. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Architect/Engineer of discrepancy and use information in hard-copy Contract Drawings and Specifications. CAD Files do not necessarily represent the latest Contract Documents, existing conditions and as-builts conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.

b. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.

c. Receiver shall not be hold Architect/ Engineer responsible for data or file clean- up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.

d. Receiver shall understand that even through Architect/Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.

1. Receiver shall not hold Architect/Engineer responsible for such viruses or their consequences, and shall hold Architect/Engineer harmless against costs, losses or damage caused by presence of computer virus in file or media.

3. Upon request to the Architect, and at the Architect's sole discretion, Base Plan Drawings only may be provided to the Contractor in electronic format (for example, AutoCAD format) by the Architect at charge rate to cover the architect's cost for producing.

4. Prior to the Architect's dispensing of documents in electronic format, the Contractor shall execute and deliver an "Electronic Media Release Agreement," provided upon request by Architect, along with said payment.

C. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1. General Coordination Provisions

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2. Cleaning and Protection

A. Contractor is to clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: Supervise Construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. High-speed operation.
20. Improper lubrication.
21. Unusual wear or other misuse.
22. Contact between incompatible materials.
23. Destructive testing.
24. Misalignment.
25. Excessive weathering.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft or vandalism.

3.3. Requests for Interpretation (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit an RFI and forward to the Construction Manager via the internet web-based service.

B. RFI'S shall originate with Contractor. RFI's submitted by entities other than Contractor will be returned with no response.

1. Coordinate and submit RFI's in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

C. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project Name.

2. Date.
3. Name of Contractor.
4. Name of Architect and Construction Manager.
5. RFI number, numbered sequentially. Use prefix based on Contract (i.e. MC, EC).
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate
9. Contractor's suggested solution(s). If Contractor solution(s) impact the Contract Time or the Contract Sum, Contractor shall state the impact in the RFI.
10. Contractors Signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings and other information necessary to fully describe items needing interpretation.
    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies and attachments.

D. Architect's Action: Architect will review each RFI, determine action required, and return it.
1. The following RFIs will be returned without action:
    a. Requests for approval substitutions.
    b. Requests for coordination information already indicated in the Contract Documents.
    c. Requests for adjustments in the Contract Time or the Contract Sum.
    d. Requests for interpretation of Architect's actions on submittal.
    e. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."
    a. If Contractors believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.

E. On receipt of Architect's and Construction Manager's action, immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

3.4. Deficiency Reports

A. If the Owner, Architect, or Construction Manager notes a deficiency in an installation, material, etc., they will issue a deficiency report via the internet web-based service to the appropriate contractor. The contractor has the designated time listed to correct the deficiency and upon completion must respond back in the internet web-based service. The A/E will then perform a follow-up inspection to confirm that the deficiency was adequately corrected.

3.5. Department of Labor Overtime Request

The DOL overtime request form shall be filled out and forwarded by each contractor to the Construction Manager prior to the start of any onsite work. Contractors will not be allowed to work Weekends or after hours unless the DOL has been properly notified.

END OF SECTION 013100

SECTION 013119 – PROJECT MEETINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Preinstallation conferences.
3. Progress meetings.
4. Coordination meetings.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section “Coordination” for procedures for coordinating project meetings with other construction activities.
2. Division 1 Section “Submittals” for submitting Contractor’s Construction Schedule.

1.3 PRECONSTRUCTION CONFERENCE

A. A preconstruction (Kick-off Meeting) conference will be scheduled before starting construction, at a time convenient to the Owner, Construction Manager and the Architect, but no later than 15 days after issuance of the Letter of Intent. The conference will be held at the Project Site or another convenient location.

B. Attendees: Authorized representatives of the Construction Manager, Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All conference participants must be knowledgeable about the Project and authorized to make decisions regarding the Work.

C. Agenda: Discuss items of significance that could affect progress, including the following:
1. Tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of Shop Drawings, Product Data, and Samples.

8. Preparation of record documents.
9. Use of the premises.
10. Parking availability.
11. Office, work, and storage areas.
12. Equipment deliveries and priorities.
13. Safety procedures.
14. First aid.
15. Security.
16. Housekeeping.
17. Working hours.

D. Reporting: Construction Manager shall prepare and issue minutes to attendees and interested parties.

1.4 PREINSTALLATION CONFERENCES

A. The Construction Manager will conduct a pre-installation conference at the Project Site before each construction activity that requires coordination with other construction.

B. Attendees: The Installer and representatives of the Prime Contractor, manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Construction Manager and Architect of scheduled meeting dates.
   1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
      a. Contract Documents.
      b. Options.
      c. Related Change Orders.
      d. Purchases.
      e. Deliveries.
      f. Shop Drawings, Product Data, and quality-control samples.
      g. Review of markups.
      h. Possible conflicts.
      i. Compatibility problems.
      j. Time schedules.
      k. Weather limitations.
      l. Manufacturer’s recommendations.
      m. Warranty requirements.
      n. Compatibility of materials.
      o. Acceptability of substrates.
      p. Temporary facilities.
      q. Space and access limitations.
      r. Governing regulations.

s. Safety.
t. Inspecting and testing requirements.
u. Required performance results.
v. Recording requirements.
w. Protection.

2. The Construction Manager will record significant discussion and agreements and disagreements of each conference and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
3. Contractors should not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.
4. Reporting: The Construction Manager will issue minutes to attendees, Owner and Architect.

1.5 PROGRESS MEETINGS

A. Progress meetings will be held at the Project Site at regular intervals (typically weekly) as determined by the Construction Manager.

B. Attendees: In addition to representatives of the Owner, Construction Manager, and the Architect, each Prime Contractor shall be represented at these meetings. Attendance is mandatory at meetings and contractor will include in their bid a sum of $250.00 per meeting to have an authorized individual in attendance capable of making decisions and providing direction. Each contractor shall plan for meetings during second shift work on a biweekly basis. During summer construction activities, the Project will require weekly meetings from the end of the school year through October of each year.

This total dollar amount will be listed as a separate line item on the contractor's Schedule of Values. If the contractor misses a meeting without prior written authorization from the Construction Manager, they will be issued a deduct change order in the amount of $250.00 per occurrence. Subcontractors, suppliers, or other entities will be invited at the discretion of the Owner, Construction Manager, and the Architect. All conference participants must be knowledgeable about the Project and authorized to make decisions regarding the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule

revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including the following:
   a. Interface requirements.
   b. Time.
   c. Sequences.
   d. Status of submittals.
   e. Deliveries.
   f. Off-site fabrication problems.
   g. Access.
   h. Site utilization.
   i. Temporary facilities and services.
   j. Hours of work.
   k. Hazards and risks.
   l. Housekeeping.
   m. Quality and work standards.
   n. Change Orders.
   o. Documentation of information for payment requests.

D. Reporting: Approximately 5 days after each meeting, the Construction Manager will prepare and distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1.6 COORDINATION MEETINGS

A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. The CM's Field Manager will conduct daily meetings with the prime contractors and major subcontractors' foremen. The purpose of the meetings is to provide the opportunity for each contractor to communicate to the Field Manager any items relating to their respective construction activity for that day (request for shutdown, deliveries, etc.) The meetings will commence from 7:00 o'clock am until 7:30 o'clock am. These meetings are generally informal. The CM's Field Manager will keep minutes of these meetings when appropriate and will be available upon request.

1.7 SAFETY MEETINGS

A. Each Contractor will be responsible to conduct their own safety meetings on a regular basis (but not less than four times during any thirty-day period.)

B. Minutes of the Safety Meeting must be maintained by each contractor onsite and must be made available upon request. Failure to conduct and submit meeting minutes will be grounds to reject the Prime Contractor's progress payment.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 013119

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013200 – PROJECT SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Work sequence.

2. Contractor use of premises.

3. Owner occupancy.

1.02 WORK SEQUENCE

A. Project Start:

1. Commence construction activity at the site as soon after contract award, unless specified otherwise, as required to comply with specified Construction Schedule.

2. Schedule material deliveries to correspond with starting dates so that materials are on site on required start date.

B. Coordination:

1. Schedule all construction activities at the site with Architect, Construction Manager (if applicable) Owner, and other prime contractors to avoid, to maximum extent, interference with Owner's operations and to meet specified completion dates.

a. It is the responsibility of all Prime Contractors to meet the Completion Schedule within the Owner's Educational Schedule.

b. Coordinate construction activities with school calendar issued by Owner to each Prime Contractor to avoid interference with normal educational process by Owner.

c. Review requirements of Contract Documents for each Prime Contract in relationship to requirements for other Prime Contractors and the Owner's Educational Schedule.

2. Coordinate all interruptions of building services or shut-down of building systems with Architect, Construction Manager (if applicable) and Owner, and obtain written approval of proposed schedule for interruptions or shut-down from Architect, Owner, and/or Construction Manager (if applicable).

a. If, in the opinion of the Owner or Construction Manager (if applicable), any such interruption or shut-down will affect life or safety of building occupants, schedule interruption of shut-down at a time acceptable to the Owner, when classes are not in session, or after normal working hours.

b. Extra payment for overtime outside normal working hours required by any such interruption or shut-down will not be made by Owner. Prime Contractor requiring overtime shall do so at his own cost and shall be responsible for extra costs incurred by other Prime Contractors as a result.

c. Insure all equipment, fittings, pipe, and similar items required are on hand before interrupting or shutting down existing systems.

d. Notify all inspectors and representatives of utility companies, village officials, Architect, Construction Manager (if applicable), Owner, and similar parties by letter in advance of required changeovers, tie-ins, removals, and similar operations.

1.03 CONTRACTOR USE OF PREMISES

A. Access to Building:

1. All Prime Contractors are directed to schedule all construction activities with Owner to allow Owner's full use of building areas and systems for normal educational process. Owner acknowledges Prime Contractors will require access to Owner-occupied areas, rooms, and systems, and intends to cooperate in making rooms and systems available for construction activities.

2. Notify Project Representative in advance of any requirements for access to any existing building outside normal working hours and days.

B. Building Security:

1. Owner will maintain building security at all times for his sole benefit. Each Prime Contractor shall retain full responsibility for security and protection of work of his Prime Contract until final acceptance by the Owner.

C. Maintenance of Building Circulation and Exits:

1. Maintain circulation corridors, exits, and exit stairs unobstructed from equipment and materials, except in areas of construction activity closed by temporary partitions.

1.04 OWNER OCCUPANCY

A. Normal School Year: Owner intends to maintain full education program during the normal school year throughout duration of project, and will make full use of buildings and sites, unless otherwise specified.

1. School and special activities may be conducted within buildings and on sites after regular school hours and on weekends during the normal school year.

2. Free access by Owner's personnel to building and site areas not scheduled for alteration or dimensional change shall be maintained by all Prime Contractors.

3. Owner's personnel will perform normal custodial and maintenance services for building areas and systems not involved in construction activities, unless otherwise indicated.

B. Summer School:

1. Owner will staff the buildings with at least administrative, custodial, and maintenance personnel during the scheduled Summer Recess.

PART 2 – PRODUCTS – (NOT APPLICABLE)

PART 3 – EXECUTION – (NOT APPLICABLE)

END OF SECTION

SECTION 013216 – CONSTRUCTION PROGRESS SCHEDULE

1.1. DESCRIPTION

A. Contractor shall develop a full schedule, in sufficient detail and clarity of form and technique so that the contractor can plan and control his work properly and the Construction Manager/Owner can readily monitor and follow the progress for all portions of the work. The Contractor shall complete the detailed schedule and submit to the CM within 10 days after contract award.

B. The schedule shall comply with the various limits imposed by the scope of work and by any contractually intermediate milestone and completion dates included in the contract.

C. The activities identified in the schedule shall be analyzed in detail to determine activity time durations in units of whole working days. All durations shall be the results of definitive manpower and resource planning by the Contractor. The Contractor will provide specific manpower loading information/crew size to support the duration proposed. (e.g. – 4-man crew get 1,000 sf/day project has 11,000 sf: thus, duration was identified as 11 days).

D. The activity data shall include activity codes to facilitate selection, sorting and preparation of summary reports and graphic. Activity codes shall be developed for:
   1. Area: Subdivision of the site into logical modules or blocks and levels.
   2. Responsibility: contractor or subcontractor responsible for the work.
   3. Specifications: 33 Division CSI format
   4. System: Division of the work into building systems or summary purposes.
   5. Milestone: Work associated with completion of interim completion dates or milestones.
   6. Pay Item: Work identified with a pay item on the Schedule of Values.

1.2. REPORTS

A. For initial submittal and each update, the contractor shall prepare the following standard report:
   1. Tabular Schedule Report sorted by Activity code and Early Start.

1.3. GRAPHICS

A. For initial submittal the contractor shall prepare the following graphic:
   1. Pure logic diagram (Precedence Format) of entire data, not time scaled, grouped by Activity code
   2. Detailed bar chart sorted by Activity Code with Early Start and Early Finish
   3. Summary bar chart summarizing by Activity Code with Early Start and Early Finish.

B. For each update the contractor shall prepare the following graphic:
   1. Bar Chart showing work activities with Early Start in the next 40 work days sorted by Activity Code and Early Start.
   2. Summary Bar Chart summarizing by Activity Code showing progress with Early Start and Early Finish.

C. For each Change Order involving adjustment in the contract time for performance the contractor shall prepare a pure logic diagram showing the changed work with all predecessor and successor activities (Fragnet).

1.4. SUBMITTALS

A. In no case shall first application for payment be approved prior to submission of acceptable preliminary schedule, detailed submittal schedule, and schedule of values.

B. Monthly updates, required schedules and graphics shall be submitted to the Construction Manager/ Owner within five working days following the end of the preceding month. Monthly updates, schedules and graphics shall be submitted electronically.

C. If any of the required submissions are returned to the Contractor (10) calendar days after the return date. Resubmittals shall be in the same quantities as noted above. Review and response by the Construction Manager/ Owner will be given within (10) calendar days after resubmission.

1.5. PAYMENT WITHHELD

A. If the contractor fails to submit the required schedule information as indicated in this section within the time prescribed or revision thereof within the requested time, the Construction Manager/ Owner may withhold approval of Progress Payment Estimates until such time as the Contractor submits the required information.

1.6. UPDATES

A. Updates of the Schedule shall be made every two weeks reflecting actual or reasonably anticipated progress as of the last working day of the month. Monthly updates of the Detailed Schedule will be made each month until all work is substantially complete.

B. The Contractor will meet with the Construction Manager/ Owner at the end of the updated period to review information in draft form before preparation of the required schedules and graphics. The Contractors will present data, prepared in advance, for review and approval of the Construction Manager/ Owner including:

1. Actual Start Dates
2. Actual Completion Date
3. Activity percent complete and /or Remaining Duration
4. Revised logic, changes in activity duration’s or resource assignments.
5. Narrative report discussing progress through the update period; changes delay or other circumstance affecting progress; status of the project with respect to completion schedule; any efforts by the Contractor to improve progress.

C. The update meeting will establish the values to be submitted for payment and will be directly related to the schedules of values in the application for payment.

D. The Contractor shall prepare a report of the meeting and make all changes, additions or corrections to the data resulting from the review. The contractor shall promptly prepare the monthly submittal following the update meeting.

1.7. CHANGES, DELAYS AND EXTENSIONS OF TIME

A. When changes or delays are experienced, the Contractor shall submit to the Construction Manager/Owner a Time Impact Analysis illustrating the influence of each change or delay on the current Contract scheduled completion date. Each time analysis shall include a Fragnet (network analysis) demonstrating how the Contractor proposed to incorporate the change or delay into the Detailed Schedule. Additionally, the analysis shall demonstrate the time

impact based on the date the change was given to the Contractor, the status of construction at the point in time, and activity duration of all effected activities. The activity duration used in this analysis shall be those included in the latest update of the Detailed Schedule, closest to the time of delay or as adjusted by mutual agreement.

B. Each Time Impact Analysis shall be submitted within ten (10) calendar days after a delay occurs or a notice of change order is given to the Contractor. In cases where the Contractor does not submit a Time Impact Analysis for a specific change or delay with a specified period of time, it shall be mutually agreed that no time extension is required. Final evaluation of each Time Impact Analysis by the Construction Manager/ Owner shall be made within fourteen (14) calendar days after receipt unless subsequent meetings and negotiations are necessary. Adjustments in the Contract time for performance shall be made only by written change order approved by the Owner. Upon approval of the Owner, Fragnets illustrating the influence of changes and delays shall be incorporated into the Detailed Schedule by the contractor during the first update after agreement is reached.

C. The time difference between the Early Finish date and the Late Finish date is defined as “float.” The “float” belongs to the Project and may be used by the Construction Manager/ Owner to benefit the Project. Changes or delays that influence activities in the network with “float” and do not extend the Critical Path (the network of activities with zero days “float”) shall not be justification for an adjustment in Contract time for performance.

END OF SECTION 013216

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for Shop Drawings, Product Data, Samples and other submittals.

B. Related Sections:

1. Section 012600 – Construction Phase Clarifications
2. Section 013200 – Project Schedule
3. Section 016000 – Product Requirements
4. Section 017000 – Contract Closeout
5. Section 017839 – Project Record Documents

1.03 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Submittal Log: Prepare and submit, with construction schedule, a separate schedule for shop drawings, product data, and samples submittals, which shall be herein referred to as a “Submittal Log”. This log shall list all required submittals specific to your trade as detailed in the various sections of the Project Specifications. Submittal log shall be submitted within one (1) calendar week of Notice to Proceed, before submitting first payment application. Submittal log shall show the following:

1. Section number.
2. Item of shop drawing, product data, and samples.
3. Date to be submitted.

B. Submittal Cover Sheet: All submissions must be provided with a Submittal Cover Sheet. The Submittal Cover Sheet follows this specification section.

1. An electronic form of the submittal cover sheet is available in PDF format upon request from the Architect.
2. The Submittal Cover sheet shall be the first page of each individual submission and/ or individual PDF file.

a. Each product submitted within a specification section shall have an individual Submittal Cover sheet attached. Combined submittals with one cover sheet will not be accepted.
b. All fields within each Submittal Cover sheet shall be completed providing the following information:

1) Name of Contractor
2) Project Name

3) Date
4) Architect's Project Number
5) Items Submitted
6) Manufacturer
7) Model Numbers
8) Submission Number
9) Specification Section
10) Acknowledgement by Contractor

3. Submissions that are provided without a Submittal Cover Sheet or not filled in correctly will not be reviewed. The Architect will advise the Contractor that the submission is incomplete. Submissions that are not corrected will be returned to the contractor REJECTED.

C. Architect's Electronic Drawing Files: Electronic digital data files of the Contract Drawings may be provided at the discretion by the Architect for Contractor's use in preparing submittals for a cost of $25.00 per drawing.

1. Architect makes no representations as to the accuracy of completeness of digital drawing files as they relate to the Contract Drawings.
2. Digital Drawing Software Program: The Contract Drawings are available in the most current version of AutoCAD.
3. Contractors requesting this service will be required to sign a disclaimer. Contractor shall fully execute a disclaimer agreement and pay a fee for preparation of the electronic files prior to their release.
4. Request for electronic files must be made in writing to the Architects office. This request must include a specific list of drawings required in this format.

D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
4. Delays associated with the above are not the Architects responsibility and rests solely with the Contractor.

E. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. The architect will not be responsible for project delays due to the contractor's failure to submit the required submittal information in time to allow for review based on the stipulated review time and to meet the project schedule.
2. Initial Review: Allow (10) ten working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
3. Re-submittal Review: Allow (10) ten working days for review of each re-submittal.
4. Submittals requiring Architect's Consultant review such as Structural Steel Shop Drawings will require longer review periods. Contractor shall submit such reviews in a timely manner to coordinate with the project schedule accordingly.

5. Where submittal are required to be approved that are part of an assembly or for items such as finishes where color selections are required. The submittal will be retained until all of the information related to these systems and color selections is provided and accepted.
6. Products with multiple submittals may be held until all necessary information has been submitted for architect to make a complete review. Submittals dependent on coordinating information from related or dependent products; or products with critical interface with other products may be held until all information is submitted for architect to make a complete review and coordinate all required information.

F. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Prepare submittals as PDF package, incorporating complete information into each PDF file, including Submittal Cover Sheet. Name PDF file with submittal number.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

2. Transmit to Architect by sending via email or utilize other web-based software such as Procore or Submittal Exchange when provided by the Construction Manager, if applicable or Owner.
3. Include Submittal number within Subject Line as requested by Architect.
4. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

1.04 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

B. The information is required to be submitted under the Submittal section from each respective Specification Section. With each item listed, the Contractor shall provide anticipated dates for submission to the Architect. The Architect will review and accept or request that corrections be made for subsequent acceptance. This acceptance will constitute a review for the submittal, shop drawings and sample submissions may commence. No Submittals or Shop Drawings will be reviewed by the Architect until an approved Submittal Schedule is in place.

1. The Submittal Schedule shall be coordinated with the overall Project Schedule to ensure that submittals are submitted and reviewed so as not to delay the Project Schedule.
2. The Architect will not be responsible for ensuring that all required Shop Drawings, Product Data, Samples or similar submittals that are required to be submitted and reviewed under the Contract Documents are submitted by the Contractor. Submissions of Shop Drawings, Product Data, Samples or similar submittals are the Contractor’s sole responsibility. Delays associated with the Contractor’s failure to provide the required submittals are the Contractor's responsibility.
3. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

4. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first (30) thirty days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
5. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

6. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.

C. Submit the following submittals: Within (14) fourteen days of contract award.

1. Submittal Schedule including dates of anticipated review and approval.

    a. No submittals will be reviewed without an approved Submittal Schedule in place.

2. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

    a. Name, address, telephone number and email address of entities performing subcontract or supplying products.
    b. Number and title of related Specification Section(s) covered by subcontract.

3. Submit the required submissions from the following submittals:

    a. Section 010000 – General Requirements
    b. Section 010200 – Insurance Requirements
    c. Section 013000 – Special Procedures and Provisions
    d. Section 013200 – Project Schedule
    e. Section 013310 – Product Approval Standard
    f. Section 014529 – Testing Laboratory Services
    g. Section 015000 – Temporary Facilities and Controls
    h. Section 024119 – Selective Demolition
    i. Section 028200 – Asbestos Abatement
    j. Section 040100 – Masonry Restoration and Cleaning
    k. Section 040140 – Natural Stone Repair and Repointing
    l. Section 042000 – Unit Masonry
    m. Section 042150 – Thin Brick Masonry
    n. Section 042223 – Interior Glazed Masonry Units
    o. Section 042300 – Glass Unity Masonry
    p. Section 044000 – Belgian Block
    q. Section 047200 – Architectural Cast Stone
    r. Section 047300 – Manufactured Stone Veneer

D. Submit within the first (28) twenty-eight days after Contract Award.

1. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014523 – Test, Inspections, and Special Inspections.
2. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
3. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
4. All remaining required submissions required for the project.

E. Submit a minimum (30) thirty days prior to Project Closeout:

1. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017000 – Contract Closeout.

1.05 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files or utilize other web-based software such as Procore or Submittal Exchange when provided by the Construction Manager, if applicable or Owner.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
b. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

2. Provide (6) six hard copies of submittals when requested by the Architect.

3. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name of Construction Manager, if applicable.
e. Name of Contractor.
f. Name of firm or entity that prepared submittal.
g. Names of subcontractor, manufacturer, and supplier.
h. Category and type of submittal.
i. Submittal purpose and description.
j. Specification Section number and title.
k. Specification paragraph number or drawing designation and generic name for each of multiple items.
l. Drawing number and detail references, as appropriate.
m. Location(s) where product is to be installed, as appropriate.
n. Related physical samples submitted directly.
o. Indication of full or partial submittal.
p. Transmittal number, numbered consecutively.
q. Submittal and transmittal distribution record.

r. Other necessary identification.
s. Notification of deviations from contract documents.
t. Remarks

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Each product within a specification section shall have a separate submittal cover.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable. Send full submittals for each product. Partial submittals will not be reviewed until all required submittal information is received. The Architect will not be responsible for project delays due to the Contractor's failure to submit the required submittal information in a complete package.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams that show factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

C. Shop drawings: Original drawing, prepared by the Contractor, subcontractor, supplier, or distributor, which illustrates some portion of the work; showing fabrication, layout, setting or erection details. Prepare project-specific information for each shop drawing. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identify details by reference to sheet and detail numbers shown on contract drawings.
b. Identification of products.
c. Schedules.
d. Compliance with specified standards.
e. Notation of coordination requirements.
f. Notation of dimensions established by field measurement.
g. Relationship and attachment to adjoining construction clearly indicated.
h. Description any conflicts with other trades.
i. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

3. Submit Shop Drawings in the following format:

    a. PDF electronic file.

D. Samples: Physical examples to illustrate materials, equipment, or workmanship, and to establish standards by which completed work is judged. Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality- control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available. Samples to be sufficient size and quantity to clearly illustrate:

    a. Functional characteristics of product or material, with related parts and method of attachment.
    b. Number of Samples: Submit (1) one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Field samples and mock-ups, as specified in technical sections.

    a. Erect on project site at location acceptable to Architect/Engineer.
    b. Construct samples or mock-up complete, including work of all trades required in finish work.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit (3) three sets of Samples. Architect will retain (2) two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least (3) three sets of paired units that show approximate limits of variations.

E. Manufacturer's Warranties:

1. The Contractor shall include in his submissions samples of all manufacturer's warranties indicating the correct time duration of the warranty as specified in the contract documents. If the documents do not specify a specific time duration, the manufacturer's standard time duration shall apply, but in no event shall it be less than the contractor's guarantee as specified in Section 017000.

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Engineers and owners, and other information specified.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.06 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

    1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, licensed in the State of New York, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

    1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.07 ARCHITECT'S SHOP DRAWING STAMP ACTIONS

A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will respond to each submittal indicating one of the following actions required:

    1. FURNISH AS SUBMITTED (FAS): Architect takes no exception to the submittal. This part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

    2. REJECTED (REJ): The submittal is rejected. See Architects comments on why submittal was rejected. Resubmit in accordance with the requirements of the Contract Documents.

        a. Submittal has not been reviewed by the Contractor and so noted.
        b. Submittal has been prepared without due regard for information called for or logically implied by the Contract Documents.
        c. Information is not sufficiently complete or accurate to verify that work represented is in accordance with the Contract Documents.

d. Do not permit submittals marked “Rejected” to be used at the Project Site, or elsewhere where Work is in progress.

3. FURNISH AS CORRECTED (FAC): No exceptions taken except what is identified by the Architect. The part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance. Furnish any additional related information as requested.

4. REVISE AND RESUBMIT (RAR): Revise the submittal based on the Architects comments and resubmit the submittal. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

   a. Do not permit submittals marked “Revise and Resubmit” to be used at the Project Site, or elsewhere where Work is in progress.

5. RESUBMISSION NOT REQUIRED (RNR): Resubmission of the submittal is not required based on Architect’s comments.

1.08 CONTRACTOR RESPONSIBILITIES

A. All submissions are to be made directly to the Architect’s office. Each Contractor shall completely review, stamp, and sign his shop drawings, product data, and samples prior to submission to Architect. The Architect will not review any shop drawings unless first reviewed by the Contractor.

B. The Contractor's responsibility for errors and omissions in submissions is not relieved by Architect/Engineer's review of submissions.

C. The Contractor's responsibility for deviations in submissions from requirements of contract documents is not relieved by Architect/Engineer's review of submissions unless Architect/Engineer gives written acceptance of specific deviations.

D. All submissions shall be accompanied by a Letter of Transmittal, signed by the Contractor’s project manager. Notify Architect/Engineer, in writing at time of submission of deviations in submissions from requirements of contract documents. In addition, all submittals shall be accompanied by a signed and dated “Submittal Cover Sheet” for each item, which acknowledges the Contractors review for completeness, correctness and accuracy of each submitted item.

E. No portion of the work requiring submissions shall be started, fabricated, or installed until return of approved submissions to the contractor.

F. After Architect review, distribute copies of submissions to parties requiring same for coordinating of work.

G. Make required copies for distribution of shop drawings, and product data, that has been stamped and signed by the Architect.

1.09 CONTRACTOR PREPARATION, REVIEW, AND SUBMISSION OF SHOP DRAWINGS, SAMPLES, MANUFACTURER'S DATA, ETC.

A. It is the responsibility of the Contractor furnishing and/or installing materials and/or systems to these projects to field verify all existing and/or as-built conditions, as well as all conditions presently under construction that are interrelated in whole or in part to the furnishing and/or installing of such materials and/or systems.

B. It is the responsibility of the Contractor, to coordinate such field verification and be ultimately responsible for the accuracy of same prior to the submission of shop drawings for design intent review by the Architect/Engineer.

C. All submittals of shop drawings, materials, samples, etc. prepared by any subcontractor and/or supplier of the Contractor or by the Contractor themselves shall be reviewed by the Contractor, prior to the submission of same to the Architect/Engineer, for: contract document accuracy and equivalency (if applicable); total quantity of material provided; all dimensioning systems related; alteration to same if necessary to accommodate accepted field changes built or pending; interaction with other materials and/or systems furnished and/or installed by this Contractor or their subcontractors (i.e., field measurements for space allocation, accuracy to previous submittals of this Contractor, etc.); and interaction with materials and/or systems provided by other Contractors.

D. After the completion of such review as stated in 1.09C above, the Contractor shall signify same by having the following information on each and every submittal:

- Name of Contractor
- Date of Review by Contractor
- Note: This submittal has been reviewed by (Name of Contractor) in accordance with the contract documents describing and defining the requirements of such review.
- Signature of reviewer.
- Name of reviewer (printed).
- Title of reviewer (printed).

E. In compliance with 1.09D above, the Contractor shall submit in writing to the Architect/Engineer and Owner's representative (if any), prior to their first submission, the name and title of the reviewer who shall be an employee of the Contractor for review and acknowledgment of same.

F. If this project has a Construction Manager who is acting on the Owner's behalf and who has full-time construction site representation, the scheduling of submissions, the coordination, and interaction of other contractors, field conditions that affect the submission of, fabrication of, or installation of another Contractor's submission, fabrication, or installation shall be made known to the Owner's Representative.

G. Any resultant construction field condition that arises that is contrary to a submission made, that is conflicting with another Contractor's submission, the schedule for construction, or with another Contractor's constructed work shall be immediately identified by the Contractor(s) and make known to the Owner's Representative, and, if such condition causes any construction schedule delay, "rereview" by the Architect/Engineer, additional work of the Architect/Engineer (such as field review, "redesign" or document preparation); or "reconstruction" of any work already built and/or accomplished by another Contractor, the connection to such conditions and associated costs to accomplish same shall be the sole responsibility of the Contractor found negligent in causing such conditions.

H. No submission to the Architect/Engineer shall contain or utilize directly portions whole or in part of the contract documents, such as the reproduction of drawings, portions of the Project Manual, etc.

I. The Architect's office reserves the right to retain any submitted technical data and shop drawings in abeyance if: submissions are incomplete, improper number of samples are submitted, if submissions are not accompanied by a properly-executed submittal cover sheet/letter of transmittal, or until all associated/interrelated shop drawings or interrelated technical data are submitted. See "K" below.

J. Any submission not containing the information outlined and required in 1.09D above will not be reviewed by the Architect/Engineer for design intent, but rather rejected and sent back to the Contractor for review by same.

K. Any submission by the Contractor that requires coordination with another material and/or system provided by this Contractor or another Contractor that has been reviewed, by that Contractor and previously submitted to the Architect/Engineer may be rejected in whole or part by the Architect/Engineer, or held in abeyance by same until the corresponding and coordinating submittals are submitted as the concurrent review of all such submittals for design intent, may be deemed important by the Architect/Engineer. Any release given any entity other than the Architect/Engineer to fabricate, furnish, and install any material or system not reviewed by the Architect/Engineer for design intent shall become the sole responsibility of the releasing entity as well as the resolution of construction related issues or conflicts.

L. In addition, the Contractor shall not utilize nor refer to any schedule of work not created nor provided by the Architect/Engineer. The Contractor's method in establishing, defining, and/or substantiating their ability to maintain the schedule presented in these contract documents and as prepared by the Owner's representative shall be exclusive of a defined time period of submittal review.

M. The rejection or abeyance noted in the above subparagraph shall not be considered a delay or a reason for an extension of time in the construction schedule to the contract, as such cause for same shall have been brought upon by the Contractor not providing the "pre-coordination" necessary for such submissions.

N. The Architect is not legally bound to the approved construction schedule; only the Contractors are bound to the approved construction schedule. The Architect is not required to expedite reviews or comments in the effort to expedite any Contractors' submissions and/or construction schedule.

1.10 DISTRIBUTION OF SUBMISSIONS:

A. The Contractor shall distribute copies of shop drawings, product data, and/or samples which carry the Architect/Engineer approval stamp to:

1. Contractor's file (as required).
2. Job site file (as required).
3. Record document file (as required).
4. Other contractors, as required for coordination (as required).
5. Subcontractor (as required).
6. Suppliers and Fabricators (as required)
7. The Construction Manager, if applicable (2 copies).

B. Distribute samples as directed, by Architect/Engineer.

C. The Contractor will be responsible for the distribution of their approved drawings/cuts in a timely manner to other Contractors (and subcontractors) for coordination with their work. Any additional costs generated due to the lack of transfer information will be borne by the Contractor responsible for distribution. In the event the Contractor fails to distribute shop drawings/product information to other Contractors (and their subcontractors), the Owner reserves the right to have the Architect make the necessary copies and Federal Express to the parties involved. All costs incurred by the Architect will be back-charged to the Contractor responsible for distributing the shop drawings/product information.

D. Shop drawings/submittals returned to the Contractors for second resubmission will require a two (2) day turnaround on resubmission. Submittals requiring a second resubmission will result in charges for additional Architect/Engineer review time.

1.11 ARCHITECT/ENGINEER:

A. Review for:

1. Design concept of project.
2. Compliance with contract documents.

B. Review of separate items does not constitute review of an assembly in which item functions.

C. Stamp and initial or sign to review of submission.

D. Return submissions to Contractor for distribution.

E. Note: Based upon the amount of multiple submittals received in one day, and their content, unless they are specifically numbered by the Contractor for their order of relative importance on his Letter of Transmittal, the Architect shall establish the level of importance of each submittal, and shall be allowed sufficient time (in the Architect's professional judgement) to permit adequate review. Such submissions will be reviewed either: a) in the time order in which they were received by the Architect's office, b) in their natural progressive order of construction placement, or c) in order of preference, as determined by the Architect. As a result of multiple/sequential submissions, no delays in time, or Contractor hard or soft costs shall be implied or imposed onto the Architect. It is the Contractor's complete responsibility to adhere to the prepared Construction Schedule at all costs, including extended delays which may be incurred by time required for adequate review from the Architect's office.

F. Architect's Stamp: The Architect's stamp (indicating initials and date), affixed to any shop drawing, manufacturer's specification cut or sample is only for design concept conformance, and general compliance with the content of the contract documents. This does not relieve the Contractor of his/her responsibility to comply with the requirements of the Contract Documents.

PART TWO – PRODUCTS

NOT APPLICABLE

PART THREE – EXECUTION

NOT APPLICABLE

END OF SECTION

BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

244 EAST MAIN STREET | PATCHOGUE | NEW YORK 11772 | T. 631.475.0349 | F. 631.475.0361
187 WOLF ROAD, SUITE 205 | ALBANY | NEW YORK 12205 | T. 518.621.7650 | F. 518.621.7655
www.BBSARCHITECTURE.COM

Submittal Cover Sheet

Name of Contractor: _____

Project Name: _____

District Name: _____

Date: _____ Architect's Project No.: _____

Items Submitted: _____

Manufacturer: _____

Model No's: _____

Submission Number: _____ Spec Section: _____

Acknowledgement by Contractor: This submittal has been reviewed by the above named contractor in accordance with the contract documents describing and defining the requirements of such review

*Signature:*_____ *Title of reviewer (print)*_____

Name (print): _____ *Date of review:* _____

Notes:

CA-CCI-2018

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013500 – COMMISSIONER REGULATIONS (PART 155.5) AND SAFETY STANDARDS

PART 1 – COMMISSIONER REGULATIONS (PART 155.5)

A. Monitoring of construction and maintenance activities:
The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy and shall be monitored during construction or maintenance activities for safety violations by school district personnel. It is the responsibility of the board of education or board of cooperative educational services to assure that these standards are continuously maintained when the building or any portion thereof is occupied.

B. Investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.
Boards of education and boards of cooperative educational services shall follow procedures established under section 155.4(d)(7) of this Part.

C. Pre-construction testing and planning for construction projects.

1. Boards of education and boards of cooperative educational services shall assure that proper planning is made for safety of building occupants during construction. For all construction projects for which bids are issued on or after September 30, 1999, such boards shall assure that safety is addressed in the bid specifications and contract documents before contract documents are advertised for bid. All school areas to be disturbed during renovation or demolition shall be tested for lead and asbestos. Appropriate procedures to protect the health of building occupants shall be included in the final construction documents for bidding.

2. Boards of education and boards of cooperative educational services shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects. The health and safety committees in school districts other than in cities with one million inhabitants or more shall be expanded during construction projects to include the project architect, construction manager, and the contractors. Such committee shall meet periodically to review issues and address complaints related to health and safety resulting from the construction project. In the case of a city school district in a city of one million inhabitants or more, the board of education shall submit procedures for protecting health and safety during construction to the commissioner for approval. Such procedures shall outline methods for compliance with this section.

3. The district emergency management plan shall be updated to reflect any changes necessary to accommodate the construction process, including an updated emergency exit plan indicating temporary exits required due to construction. Provisions shall be made for the emergency evacuation and relocation or release of students and staff in the event of a construction incident.

4. Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures whenever such temporary exits and revised emergency procedures are required.

D. Pre-construction notification of construction projects.
The board of education or board of cooperative educational services shall establish procedures for notification of parents, staff and the community in advance of a construction project of $10,000 or more to be conducted in a school building while the building is occupied. Such procedures shall provide notice at least two months prior to the date on which construction is scheduled to begin, provided that in the case of emergency construction projects, such notice shall be provided as far

in advance of the start of construction as is practicable. Such notice shall include information on the district's obligations under this section to provide a safe school environment during construction projects. Such notice requirement may be met by publication in district newsletters, direct mailings, or holding a public hearing on the project to inform parents, students, school personnel and community members.

E. General safety and security standards for construction projects.
1. All construction materials shall be stored in a safe and secure manner.
2. Fences around construction supplies or debris shall be maintained.
3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
5. Workers shall be required to wear photo identification badges at all times for identification and security purposes while working at occupied sites.

F. Separation of construction areas from occupied spaces.
Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

1. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.

2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

3. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

G. Maintaining exiting and ventilation during school construction projects.
The following information shall be included in all plans and specifications for school building projects:

1. A plan detailing how exiting required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

2. A plan detailing how adequate ventilation will be maintained during construction. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.

H. Fire and hazard prevention.

Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:

1. No smoking is allowed on public school property, including construction areas.
2. During construction daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment or debris not block fire exits or emergency egress windows.
3. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.

I. Noise abatement during construction and maintenance activities.

Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise. Complaints regarding excessive noise shall be addressed through the health and safety committee. The district should anticipate those times when construction noise is unacceptable and incorporate “no work” periods into the bid specifications.

J. Control of chemical fumes, gases, and other contaminants during construction and maintenance projects.

The bid specifications and construction contracts for each construction project shall indicate how and where welding, gasoline engine, roofing, paving, painting or other fumes will be exhausted. Care must be taken to assure fresh air intakes do not draw in such fumes.

1. The bid specifications shall require schedules of work on construction and maintenance projects which include time for off-gassing of volatile organic compounds introduced during construction before occupancy is allowed. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which off-gas chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or the manufacturer's recommended off-gassing periods must be scheduled between installation and use of the space. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated and the material must be given proper time to cure or off-gas before re-occupancy.

2. Manufacturer's material safety data sheets (MSD) shall be maintained at the site for all products used in the project. MSDS must be provided to anyone who requests them. MSDS indicate chemicals used in the product, product toxicity, typical side effects of exposure to the product and safe procedures for use of the product.

K. Asbestos abatement protocols.

All asbestos abatement projects shall comply with all applicable Federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56 (12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). Large and small asbestos projects as defined by 12 NYCRR 56 shall not be performed while the building is occupied. Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be

performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.

L. Lead paint.
Any construction or maintenance operations which will disturb lead based paint will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines.

M. Radon.
Districts shall take responsibility to be aware of the geological potential for high levels of radon and to test and mitigate as appropriate. This information is available from the New York State Department of Health Radon Measurement Database.

N. Post construction inspection.
The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

PART 2 – ADDITIONAL SAFETY STANDARDS

A. Certificate of Occupancy Statement: The existing building will be occupied during construction. Throughout the duration of construction, the contractor shall maintain the integrity of the existing structure. The occupied portion of any school building and required exits shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.

B. Asbestos / Lead / Polychlorinated Biphenyls Test Letter: All existing school areas to be disturbed during renovation or demolition (existing facilities building envelope components, interior finishes and concealed utility infrastructure) have been tested for lead, asbestos and Polychlorinated Biphenyls containing materials in accordance with OSHA, EPA, DEC and DOH requirements. Material test results are provided within the Project Manual. If negative for asbestos, Item J below does not apply. If negative for Lead, Item K below does not apply. If negative for Polychlorinated Biphenyls (PCB) item L does not apply.

C. Safety and Security Standards for Construction Projects: Throughout the duration of this construction project, the following general safety and security standards shall be maintained by all Contractors on site:

1. All construction materials shall be delivered during the times as stipulated by the School District. Locations for on-site storage shall be coordinated with the Owner's Representative.

2. Temporary construction fencing shall be erected around construction activity areas in accordance with Specification Section 015000. When indicated in the drawings, construction fencing will be shown on the Construction Implementation Plans. All fencing around construction activity areas shall be maintained to restrict unauthorized access and prevent students from entering site. Fencing around construction supplies or debris shall be maintained.

3. Gates securing construction activity areas shall be secured and locked at all times unless manned by contractor personnel to prevent unauthorized access. Signs stating "Caution –

Construction Activity Area Construction Personnel Only, Unauthorized Access Prohibited" shall be posted at all entry points and 75' intervals along security fence.

D. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building in accordance with Specification Section 015000.

1. Contractors shall remove large amounts of construction debris and rubbish from the building using enclosed chutes or other similar sealed system to contain dust and other particulate. No material shall be dropped or thrown outside the walls of the building. Removal of construction debris and rubbish shall be through construction areas only, there shall be no movement of debris through halls of occupied spaces of the building.

2. Dust and debris generated by construction activities in occupied parts of the building shall be cleaned by the Contractor at the close of each workday in accordance with the General Requirements of Division 01, Specification Sections 013200 and 015000. The Contractor is responsible to maintain all health, safety, public address systems and educational capabilities of occupied areas within the school building at all times that classes are in session.

E. Exiting Plan: A plan showing how exits required by NYS Building Code will be maintained. This is typically shown within CIP and/or Code Compliance Plans.

F. Ventilation During Construction: A plan showing how required ventilation will be maintained during construction. This is typically shown within CIP and/or Code Compliance Plans.

G. Construction Noise: Construction and maintenance operations shall not produce noise in excess of 60 DBA in occupied spaces, or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical treatments shall be placed so as to abate the excessive noise levels. Acoustic treatments shall be prescribed by the Architect and supplied and installed by the Contractor.

H. Construction Fume Control: The Contractor shall be responsible for the control of chemical fumes, gasses and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, etc., to ensure they do not enter occupied portions of the building or air intakes.

I. Off-Gassing Control: The Contractor shall be responsible for ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured, or ventilated in accordance with manufacturer's recommendations before a space can be occupied.

J. Asbestos Code Rule 56 Compliance: Where so indicated by positive test results, portions of the project may entail the removal of asbestos containing material as defined by 12NYCRR56. Large and small asbestos abatement projects (as defined by 8 NYCRR 155.5(k)) shall not be performed while the building is occupied. (Definition of "building", as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction.) The isolated portions (the occupied portion and the portion under construction) of the building must contain separate code compliant exits. The ventilation systems must be physically separated and sealed at the isolation barrier(s).

Removal of asbestos containing material shall only be performed when the building, as defined above, is unoccupied. The Contractor shall verify that the building has been vacated prior to commencing asbestos abatement work. If the building is configured such that the affected area can be completely isolated from the unaffected areas with sealed non-combustible construction barriers, then the unaffected areas can remain occupied provided required exits are maintained independently in both areas.

Removal of asbestos containing materials on the exterior of the building such as flashing, roofing, siding or soffit and caulking may be performed on occupied buildings provided all variances have been granted and the occupants have been notified of the intention to remove asbestos containing material. Complete isolation of ventilation systems supplying the occupied spaces and windows must be maintained throughout the removal duration.

Asbestos TEM: Where so indicated by positive test results, the asbestos abatement area shall be completely sealed off from the rest of the building and completely cleaned and tested by TEM prior to re-entry by the public.

K. Lead Abatement Projects: At interior painted surfaces which have tested Positive for Lead: Portions of walls that will be disturbed as a requirement of this contract shall be removed in accordance with the Lead Safety Plan included within the Project Manual. This section clearly references OSHA regulations to be followed, and clean-up and testing associated with lead abatement must be done in strict conformance with HUD protocol. Locations where construction activity requires the removal of lead containing materials shall be completely isolated from occupied portions of the building using a construction barrier. The Contractor shall have all surrounding areas tested for lead levels prior to commencing work and after work has been completed to ensure that surrounding areas have not been contaminated by removals.

L. PCB Projects: Any window caulking tested and found to contain PCBs must be removed in accordance with U.S. EPA regulations under the Toxic Substances Control Act (40 CFR 761.62). Soil areas adjacent to windows containing PCBs must follow the 40 CFR 761.62 criteria. A site-specific abatement plan must be developed to address potential environmental and public health concerns. Steps for abating contamination and preventing contamination of nearby areas must be done in accordance with HUD Technical Guidelines for the Evaluating and Control of Lead Based Paint Hazards in Housing.

Removal of PCB containing materials on the exterior of the building such as caulking may be performed on occupied buildings provided all variances have been granted and the occupants have been notified of the intention to remove PCB containing material. Complete isolation of ventilation systems supplying the occupied spaces and windows must be maintained throughout the removal duration.

M. Fire Prevention: Any holes in floors or walls shall be sealed with a fire-resistant material whose rating meets or exceeds that of the construction to which it is attached.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 014213 – ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section lists and defines various common abbreviations which are used throughout the Contract Documents.

B. Abbreviations of organizations and federal agencies which publish standards, codes, and regulations are defined in Section 014219 – Applicable Standards.

C. Other abbreviations and symbols may be found in legends and elsewhere on the Drawings. Piping material abbreviations are contained in the piping sections.

D. Should an abbreviation or symbol not be specifically defined, it shall carry the standard definition commonly used in the industry.

E. Whenever any doubt arises as to what an abbreviation or symbol means, notify Engineer and he will issue a definition in writing.

1.02 ABBREVIATIONS

A. The following is a list of commonly used abbreviations which may be found in the Contract Documents, and the meanings ascribed to them:

A.C. or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or Amp	Amperes
Alum.	Aluminum
Asph.	Asphalt
AWG.	American Wire Gauge
Aux.	Auxiliary
Bit. Conc.	Bituminous Concrete
CB	Circuit Breaker
Cl.	Class
cm	Centimeter
C.O.	Clean out
Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
C.F.	Cubic Feet
CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
C.Y.	Cubic Yards
CT	Current Transformer
D.C. or dc	Direct Current
DFT.	Dry Film Thickness
Dia.	Diameter
DWG. or Dwg.	Drawing
Dr.	Drive

Ea. or ea.	Each
EF	Each Face
EW	Each Way
Eff. or eff.	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
Ft. or ft.	Feet
ftg.	Footing
g.	Grams
Ga. or ga.	Gauge
Gal. or gal.	Gallon
Galv.	Galvanized
GPD or gpd	Gallons Per Day
GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hz. or hz	Hertz
I.D.	Inside Diameter
Inv.	Invert
KVA or kva	Kilovolts-amperes
Kw or kw	Kilowatts
kwh or KWH	Kilowatt-hours
Lbs. or lbs.	Pounds
L.F.	Linear Feet
LPA	Lighting Panel "A"
L.S.	Lump Sum
m.	Meters
mA	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
mg.	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles
Min. or min	Minimum
mm	Millimeters
No. or no.	Number
nom.	Nominal
N.T.S.	Not To Scale
O.D.	Outside Diameter
O & M	Operations and maintenance
Oz. or oz.	Ounce
pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch,
psig	Pounds Per Square Inch, Gauge Pressure
PT	Potential Transformer
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-of-Way
Sch.	Schedule
sec.	Secondary or Seconds
S.F.	Square Feet
S/S/P/	Stop-start-pilot Station

Std. or std.	Standard
S.Y.	Square Yards
T&B	Top and Bottom
Typ.	Typical
U.O.N.	Unless Otherwise Noted
U.V.	Ultraviolet
V or v	Volts
Vac or VAC	Alternating current Voltage
Vdc or VDC	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume
W or w	Watts
Yd. or yd.	Yards

1.03 SYMBOLS

A. The following is a list of commonly used symbols which may be found in the Contract Documents, and the meanings ascribed to them:

P	Phase, Diameter, or Round (as applicable)
D	Degrees (F. = Fahrenheit C. = Centigrade)
'	Feet or Minutes
"	Inches or Seconds
#	Number or Pound
/	Per or Divided by

PART 2 - EXECUTION

(NOT UTILIZED)

PART 3 - EXECUTION

(NOT UTILIZED)

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 014219 – APPLICABLE STANDARDS

PART 1 - GENERAL

1.01 GENERAL

A. Work included:

1. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and type of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.

2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship, which meet or exceed the specifically named code or standard.

3. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the Architect, to deliver to the Architect all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Architect, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Architect.

B. Related Documents:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Rejection of non-complying items: The Architect reserves the right to reject items incorporated into the Work, which fail to meet the specified minimum requirements. The Architect further reserves the right, and without prejudice to other recourse the Architect may take, to accept non-complying items subject to and adjustment in the Contract Amount as approved by the Architect and the Owner.

1.03 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States. “

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

C. Applicable standards listed in these Specifications include, but not necessarily limited to, standards promulgated by the following agencies and organizations:

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
6. ABMA - American Boiler Manufacturers Association; www.abma.com.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME – ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC – Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; www.awpa.com.

40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
48. CDA - Copper Development Association; www.copper.org.
49. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - CSA Group; www.csagroup.com.
64. CSA - CSA International; www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).

91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Accreditation Service; www.iasonline.org.
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NEC - National Electrical Code (See NFPA).
137. NECA - National Electrical Contractors Association; www.necanet.org.
138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.

141. NFPA - National Fire Protection Association; www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA – Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tileroofing.org.
190. UL - Underwriters Laboratories Inc.; www.ul.com.
191. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
192. USAV - USA Volleyball; www.usavolleyball.org.
193. USGBC - U.S. Green Building Council; www.usgbc.org.

194. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
195. WA - Wallcoverings Association; www.wallcoverings.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; www.wicnet.org.
201. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
202. WWPA - Western Wood Products Association; www.wwpa.org.

D. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO – International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

E. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DHHS - Department of Health and Human Services; www.hhs.gov.
4. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOD - Department of Defense; www.quicksearch.dla.mil.
6. DOE - Department of Energy; www.energy.gov.
7. EPA - Environmental Protection Agency; www.epa.gov.
   Part 61, Sub-Part M
   National Air Emissions Standards for Hazardous
   Air Pollutants (NESHAP)
   40 CFR Paret 763, Subpart E
   Asbestos Hazard Emergency Response Act (AHERA)
8. FAA - Federal Aviation Administration; www.faa.gov.
9. FG - Federal Government Publications; www.gpo.gov/fdsys.
10. GSA - General Services Administration; www.gsa.gov.
11. HUD - Department of Housing and Urban Development; www.hud.gov.
12. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
13. NIOSH – National Institute for Occupational Safety & Health; www.cdc.gov/niosh/index.htm.
14. OSHA - Occupational Safety & Health Administration; www.osha.gov.
15. SD - Department of State; www.state.gov.
16. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
17. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
18. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
19. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
20. USP - U.S. Pharmacopeial Convention; www.usp.org.
21. USPS - United States Postal Service; www.usps.com.

F. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
   a. Available from Defense Standardization Program; www.dsp.dla.mil.
   b. Available from General Services Administration; www.gsa.gov.
   c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

G. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS - California Department of Health Services; (See CDPH).
4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal- iaq.org.
5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
6. SED/SLD - State Education Department and State Labor Department; www.nysed.gov & dol.ny.gov.
7. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
8. TFS - Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

SECTION 014500 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1. Section Includes

A. Requirements for monitoring the quality of the constructed project.
B. Work of this Section also includes services of an independent testing laboratory for quality assurance testing.

1.2. Related Sections

A. The following Sections contain requirements that relate to this Section:
   1. Division 1 Section “Testing Laboratory Services” specifies requirements for coordination and notification of any owner-tested items.
   2. Division 1 Section “Submittals” specifies requirements for development of a schedule of required tests and inspections.
   3. Division 1 Section “Special Inspections & Structural Testing”

1.3. Quality Assurance- Control of Installation

A. Contractor shall continually monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise
C. Perform work by persons qualified and skilled to produce workmanship of specified quality.
D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
F. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.
   1. Contractor Responsibilities:
      a. Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum unless specifically identified as provided by others.
      b. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor’s responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
      c. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner’s responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.

d. Where individual Sections specifically indicate that certain inspections, tests and other quality-control services are the Owner's responsibility, the Owner will engage the services of a qualified independent testing agency to perform those services. Payment for these services will be made from the Inspection and Testing Allowance, as authorized by Change Orders.

1.4. Mock Up

A. Tests will be performed under provisions identified in this section and identified in This Section and identified in the respective product specification sections**.**
B. Assemble and erect specified mock-ups with specified attachment and anchorage devices, flashing, seals, and finishes.
C. Accepted mock-ups shall be a comparison standard for the remaining work.
D. Where a mock-up has been accepted by the Engineer/Architect and is specified to be removed, the Contractor shall remove the mock-up and restore the area of the mock-up when directed to do so by the Engineer/Architect.

1.5. Quality Assurance - Testing Laboratory

A. In order to establish compliance with the Contract Documents, materials shall be tested, examined and evaluated before they are incorporated into the work. During and after installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.
B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.
C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.
D. in the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Engineer/Architect reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.
E. Construction Manager/Architect reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Engineer/Architect.
F. The testing laboratory shall meet the following criteria:
    1. Be capable of performing all of the required tests.
    2. Be regularly engaged in performing the types of services required.
    3. Have adequate facilities, materials, equipment, and personnel to perform the services.
    4. Have an adequately trained, experienced and qualified staff.
    5. Have at least one registered professional engineer licensed in the state in which the project is located who shall be capable of performing field tests, supervising laboratory

testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.

6. Shall be able to be on the Project site within two hours after being notified.
7. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.6. Reference Standards

A. Conform to reference standards by the date that the project was last bid.
B. Obtain copies of standards when required by Contract Documents.
C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
D. The contractual relationship of the parties of the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.7. Submittals

A. Within fifteen (15) calendar days from the date of the Notice to Proceed, submit documentation from three (3) testing laboratories that clearly indicates experience, location, qualifications of staff, and descriptions of any limitations or restriction of the firm.
B. Certified copies of each test report shall be mailed, sent overnight via a major courier, or emailed directly to the Engineer/Architect. The Contractor shall arrange with the laboratory to secure copies for their use.
C. Each report shall be in writing and shall include the testing method used, the test results, the specified results, the exact location of where the test specimens were taken, the date taken, Project identification, Contractor's name and other pertinent information required for a complete and meaningful test report,
D. Each report shall be signed and certified by the responsible officer of the testing laboratory.
E. Mail, send via overnight courier, or email reports directly to the Engineer/Architect within 24 hours after the sample is taken, except in those instances when tests cannot be immediately performed because of required curing, incubation periods, or lengthy testing procedures.
F. The laboratory shall verbally communicate test results when requested by the Engineer/Architect. This does not eliminate nor replace the requirements for a written report.

1.8. Scheduling- Laboratory Services

A. Except where otherwise specified, the Architect/Construction Manager will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.
B. Architect/Construction Manager will notify Contractor of his decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.

C. In addition to the above, Contractor shall make his own arrangements for the sampling and testing of materials he proposes to incorporate into the work. This shall not be paid for out of cash allowance.
D. Notify Architect/Construction Manager at least 48 hours in advance of the times at which scheduled samples or tests will be conducted.
E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Where possible, any work that has been installed but has not been sampled or tested as required, shall be tested by other means. Upon Architect/Construction Manager request, uncover any work, which has been buried or covered, and perform special tests designated. If the work cannot be tested by other means, Architect/Construction Manager may declare the work unacceptable. All cost associated with noncompliance and for special testing shall be borne by the Contractor and not be paid for out of the cash allowance.
F. Should the testing laboratory be scheduled to take or collect samples or to perform tests, and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other reason, reschedule the tasks for a date acceptable to Architect/Construction Manager. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor and will not be paid for under the allowance.
G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.9. Testing Requirements

1.10. Testing Schedule

1. This requirement shall be subject to change as required by the Engineer/Architect.

1.11. Field Observation of Contractor's Work

A. The Architect/ Construction Manager will provide periodic observation of the Contractor's work in accordance with the General Conditions of the Contract.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1. Examination

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2. Preparation

3.3. Field Quality Control

A. Allow representative of the testing laboratory access to the work at all time. Provide all equipment, labor, materials and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.

B. Test specimens and samples shall be taken by the person (s) designated in other Sections, or as directed by Architect/Construction Manager. Conduct field sampling and testing in the presence of Architect/Construction Manager. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

END OF SECTION 014500

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 014523 – TESTS, INSPECTIONS & SPECIAL INSPECTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to Work of this Section.

1.02 SCOPE / SUMMARY

A. Scope: This project will require both general inspections and special inspections coordinated with all required testing and certifications throughout the Project Manual and/or the Building Code of the State of New York, as listed below. The Project Manual shall be carefully reviewed by the Prime Contractors for actual and detailed descriptions concerning responsibilities with regard to testing parameters. All testing which is assigned to a Prime Contractor shall be borne as a part of their submitted Base Bid for this project, and shall not be subject to additional costs to the Owner. There are specific general inspections, as well as coordination of inspections, which are to be included in each Prime Contractor's Base Bid submitted; refer to each specification section for complete information. ***Note: The cost of all General and Special Inspections performed by the independent testing laboratory/laboratories retained by the Owner shall be directly borne by the Owner, implemented by and coordinated through the Owner's Representative and/or the Construction Manager.***

B. Summary:

1. This Section includes responsibilities relating to quality control services and extent of quality control services to be performed.

2. Related Work Specified Elsewhere

    a. Section 014529 – Testing Laboratory Service.

3. Definitions: Quality control services include inspections and tests, special inspections and actions related thereto including reports, but do not include contract enforcement activities performed directly by Architect/Engineer. Quality control services include those inspections and tests, special inspections and related actions performed by independent agencies and governing agencies as well as directly by Contractor.

    a. Testing service is required to immediately notify the Architect and the Construction Manager of discrepancies observed in the Work performed and to be performed to the Contract Documents.

4. Inspections, tests, special inspections and related actions specified in this Section and elsewhere in Contract Documents are not intended to limit a Contractor's quality control procedures which facilitate compliance with requirements of Contract Documents.

5. Requirements for quality control services by Contractor, as requested or to be requested by Architect/Engineer, Owner, governing authorities, or other authorized entities are not limited by provisions of this Section.

6. Contractors shall review and become familiar with the requirements of Article 13.5, Tests and Inspections, of the General and Supplementary Conditions covering the provisions for testing of the Work.

1.03 RESPONSIBILITIES

A. Contractor shall coordinate with independent testing agency performing inspections, tests, and quality control services.

1. Construction Manager will schedule services of independent testing agency to perform services so specified. When no Construction Manager is hired by the Owner, it will be the Contractor's contractual responsibility to schedule the services of independent testing.

2. The Owner will pay for services of the independent testing laboratory, awarded through the Owner's Representative. Source of services as well as payment and rates of payments will be as directed by the Owner's Representative. Testing specified herein shall be performed at a minimum. Construction Manager or Architect may request additional testing; payment for additional testing is subject to the provisions of the General Conditions.

B. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are responsibility of Contractor. Retesting of work revised or replaced by Contractor is Contractor's responsibility, where required tests were performed on original work. Retesting shall be performed by testing laboratory as directed by the Owner's Representative.

C. Responsibility for Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.

D. Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. It is the contractual responsibility of the Contractor to continually notify the Owner's Representative of all scheduling of times for inspections, tests, taking of samples, and similar activities.

1.04 SAMPLING AND TESTING (GENERAL)

A. Sampling and testing are required for the following Sections of Work and, unless otherwise indicated, shall be performed by an independent testing lab and paid for by the Owner through the Owner's Representative. ***Note: Certain sections indicated under this item also have specific BCNYS Special Testing & Inspection requirements, which shall be conducted in conformance with BCNYS Chapter 17 guidelines; all special testing & inspection costs shall be borne by the Owner. Refer to item 1.22 for the listing of special inspections required. Where an item may be duplicated under both general and special inspections, only one set of testing is required; special inspection requirements shall prevail.***

1. Section 033000 – Cast-in-Place Concrete: Inspection of reinforcing steel placement; field quality control of concrete; tests for concrete materials and mix design tests (slump, air content, temperature, compression test, compressive strength tests (cylinders) taken at 7 & 28 days. Testing of FF/FL floor tolerances.

2. Section 033000 – Cast-in-Place Concrete: Curbs: Random batch testing shall be made. Refer to 03311, 2.01.C.2 for additional information. ***Note: this item also has specific BCNYS***

Special Testing & Inspection requirements, which shall be conducted in conformance with BCNYS Chapter 17 guidelines; all special testing & inspection costs shall be borne by the Owner.

3. Section 035416 – Self Leveling Cementitious Underlayment: Field quality control slump testing and cubes tested in accordance with ASTM C109. Refer to 035416 for additional information.

4. Section 042000 – Unit Masonry: Field quality control of unit masonry and masonry assemblies.

5. Section 051200 – Structural Steel Framing: Field quality control for welds; field quality control for high strength steel torqued bolted connections; field quality control for structural steel alignment.

6. Section 051200 – Structural Steel Framing: Source quality control (per 051200) materials and fabrication procedures; Per 015200 – Inspection of high-strength bolted connections, shop and field welding.

7. Section 052100 – Steel Joist Framing: Source quality control SJI (Steel Joist Institute) certifications through steel fabricator. Inspection of high-strength bolted connections, shop and field welding.

8. Section 053000 – Metal Decking: GC to supply certified shop drawings per Section 053000.

9. Section 054000 – Cold Formed Metal Framing: for field quality control.

10. Section 078100 – Spray-Applied Fire Resistive Materials: Conduct testing per 078100 requirements.

11. Section 078413 – Penetration Firestopping: Conduct testing per 078413 requirements.

12. Section 078443 – Joint Firestopping: Conduct testing per 078443 requirements.

13. Section 085113 – Aluminum Windows: Field quality control testing per 085113.

14. Section 099000 – Paints: Field quality control for painting.

15. Section 221000 – Plumbing Domestic Water Piping System: Plumbing Contractor to conduct testing per 221000.

16. Section 221316 – Plumbing Sanitary Piping System: Plumbing Contractor to conduct testing per 221316.

17. Section 221400 – Plumbing Storm Water Piping System: Plumbing Contractor to conduct testing per 221400.

18. Section 230593 – Inspection, Testing & Balancing: HVAC Contractor to conduct testing per 230593.

19. Section 260500 – General Provisions – Electrical Contractor to conduct testing per 260500 requirements.

20. Section 262416 – Panelboards: Electrical Contractor to conduct testing per 262416 requirements.

21. Section 284613 – Fire Alarm System: Electrical Contractor to conduct testing per 284613 requirements.

22. Section 310000 – Earthwork – Daily testing of in-situ soil, submitted to the Owner's Representative.

23. Section 310000 – Earthwork: Soil testing and inspection service during earthwork operations for subgrades and fill.

24. Section 310000 – Earthwork – Excavating, Backfilling & Compacting for Utilities: Testing at intervals not exceeding 200'-0" of trench for first and every other 8" lift of compacted trench backfill.

25. Section 310000 – Earthwork – Excavating, Backfilling & Compacting: Testing at intervals not exceeding 200'-0" of trench for first and every other 8" lift of compacted trench backfill. Refer to 02224, 3.09A for additional information.

26. Section 321216 – Asphalt Paving: Field density testing, moisture & density relationship, mechanical analysis, plasticity index, base material, thickness and compaction, source testing. Refer to 02230, 3.02A-D for additional information.

27. Section 321216 – Asphalt Paving: Testing paid for by General Contractor – Per 02602, 3.04B, testing of finished surface of the base course shall be accomplished by the GC; utilizing a 16 foot straight edge (a 10 foot straight edge used on vertical curves).

28. Section 321216 – Asphalt Paving: Quality control testing of uncompacted asphalt concrete mix and in-place compacted pavement.

Note: For those projects utilizing a Construction Manager, the Construction Manager's involvement with testing shall be limited to coordinating, documenting (recording the date, time, location and type of test being performed), witnessing, filing copies of reports prepared by the testing agency, and transmitting copies of the reports to the Owner. The reports shall be prepared by the testing agency in accordance with criteria established by 1.04 of this Section and BCNYS Chapter 17 and in a format approved by, the Architect/Engineer. Where no Construction Manager is retained, the coordination and documentation of all required tests shall be the complete and sole responsibility of the Prime Contractor responsible for the work being tested in conjunction with the testing agency.

Note: The Construction Manager will coordinate and document (recording the date, time, location and type of test being performed) all special inspections or testing as required by BCNYS Chapter 17 requirements.

B. Additional Information: All Prime Contractors shall review all specifications of their disciplines for additional information concerning general testing services necessary for this project. The list provided above shall not be considered mutually exclusive.

C. Test procedures to be used shall be submitted for approval of the Owner's Representative where other than those specified are recommended by the testing agency.

1.05 QUALIFICATION OF LABORATORY

A. Shall meet "Recommended Requirements of Independent Laboratory Qualifications," published by American Council of Independent Laboratories. For concrete and steel the laboratory shall comply with the basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

B. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of deficiencies reported by inspection.

C. Testing equipment shall be calibrated at maximum 12 month intervals by devices of accuracy traceable to either:
   1. National Bureau of Standards.
   2. Accepted values of natural physical constants.
   3. Submit copy of certificate of calibration, made by accredited calibration agency.

D. Refer to Section 014529 – Testing Laboratory Service for additional requirements.

E. Laboratory is not authorized to:

   1. Release, revoke, alter or enlarge on requirements of Contract documents.
   2. Approve or accept portion of work.
   3. Perform duties of the Contractor.

1.06 SUBMITTALS

A. Testing document submittal procedures shall be as requested by the Construction Manager and the Architect.

B. Promptly submit two (2) copies to the Owner's Representative one (1) to be turned over to the Owner), two (2) copies directly to the Architect/Engineer, and one (1) to the Contractor of reports of inspections and test, including the following information, as applicable:

   1. Date issued.

   2. Project title and number.

   3. Testing laboratory name and address.

   4. Name and signature of field inspector.

   5. Date of inspection or sampling.

   6. Record of temperature and weather.

   7. Name and signature of laboratory inspector.

   8. Identification of product and specification section.

   9. Location in project.

   10. Designation of the work and test method.

   11. Observations regarding compliance with Contract Documents.

   12. Complete inspection or test data.

   13. Test results and interpretation of test results.

   14. Recommendation on retesting.

1.07 SOIL COMPACTION TESTING

A. The Contractors for the Work of Division 31 specification – “Earthwork” shall cooperate and coordinate with the soil testing and inspection service for quality control testing during earthwork operations as follows:

1. Field density test reports.

2. One optimum moisture-maximum density curve for each type of soil encountered.

3. The Contractor shall arrange for Soils Engineer to be on the site for observation and testing during times when the following operations are being performed:

   a. Proofrolling.

   b. Compaction of subgrades and fill. During compaction operations, the Soils Engineer shall carefully monitor existing foundations to detect possible foundation movements. If movement is detected, Work shall be stopped and the Architect immediately notified.

B. Percentage of Maximum Density Requirements: Provide not less than following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material in place.

1. Foundations: Compact top 12 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.

2. Building Slabs and Steps: Compact top 12 inches of subgrade and each 8 inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.

3. Lawn, Unpaved Areas, and Borrow Pit: Compact top 6 inches of subgrade and 8 inch layer of backfill or fill material to 90 percent Modified Proctor maximum dry density.

4. Walkways: Compact top 6 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.

5. Pavements: Compact top 12 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.

6. Underground Utilities: Provide the preceding requirements for the respective utility location(s).

7. Underground Piping and Conduit Outside Building:

   a. Bedding shall begin by placing 4 to 6 inch bedding of the approved backfill material and compacting to between 85 to 90 percent of the Modified Proctor Maximum Dry Density. The width of the bedding shall be the diameter of the pipe plus 2 feet.

   b. Haunching shall consist of placing the approved backfill material to the spring line of the pipe and conduit and compacting between 85 to 90 percent of the Modified Proctor Maximum Dry Density. This lift shall not exceed 9 inches loose. The pipe and conduit bedding and flow line shall not be disturbed as a result of the haunching operation.

   c. Initial backfill shall consist of placing the approved backfill material to the top of the pipe and conduit and compacting to between 85 and 90 percent of the Modified Proctor Maximum Dry Density. This lift shall not exceed 9 inches loose. Crushed or buckled pipe and conduit as a result of the backfilling operations will be removed and replaced with no additional payment.

d. Initial backfill shall continue in 6-inch lifts with the approval backfill material to a depth of 12 inches above the pipe.

e. Finish backfilling of the trench shall consist of placing the approved backfill or material from the trench excavation in 6-inch lifts to the grade of the trench. Finish backfilling within paved areas shall continue to the base of the compacted aggregate with the approved backfill material.

8. Retaining Walls: Compact each 8 inch layer of backfill or fill material to 95 percent Standard Proctor Maximum Dry Density.

C. Quality Control Testing During Construction: Testing service must inspect and approve subgrades and fill layers before further construction work is performed thereon. Tests of subgrades and fill layers will be taken as follows:

1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect, except that a minimum of one test shall be performed for each 15,000 sq.ft. of building area.

2. Paved areas and Building Slab Subgrade: Make at least on field density test of subgrade for every 2,000 sq.ft. of paved area or building slab, but in no case less than 3 tests.

3. Foundation and Retaining wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.

4. Trench Backfill: For each compacted backfill layer make one field density test between each drainage structure.

D. If, in the opinion of the Architect, based on reports of testing service and inspection, subgrade or fills which have been placed are below specified density, additional compaction work and testing shall be provided by the Contractor for the Section of Work involved at no additional expense, until subgrades or fills meet or exceed specified density.

1.08 BITUMINOUS PAVING TESTING

A. The Contractor for the Work of Division 32 specification “Asphalt Pavement” shall cooperate and coordinate with the testing laboratory to perform field inspection of the pavement work, unless specifically noted otherwise.

B. Field quality control testing shall be performed during paving operations. Perform the following sampling and testing of asphalt concrete mixtures for quality control during paving operations. Record the locations where samples are taken to correlate with subsequent testing.

C. Test uncompacted asphalt concrete mix and report the following:

1. Sampling: AASHTO T168 (ASTM D979).

2. Asphalt Cement Content: AASHTO T164 (ASTMD2172).

3. Perform at least one initial test for paving, unless otherwise specified or directed.

D. Test in-place, compacted pavement for density and thickness, as herein specified. Perform one test for each 500 sq.yds. but not less than one test per day, unless otherwise specified or directed.

E. The Contractor shall pay for and perform additional Work and testing as may be required if any of the previous tests indicate insufficient values or if directed by the Architect. Continue Work and testing until specified values have been attained.

F. Asphalt concentrate material not complying with specified requirements will not be acceptable. The Contractor shall repair or remove and replace defective paving as directed by the Architect, at no additional cost to the Owner.

1.09 INSPECTION OF REINFORCING STEEL PLACEMENT

A. The Contractor for the Work of Division 03 specifications for "Cast-In-Place Concrete", shall cooperate and coordinate with the testing laboratory to perform field inspection of the placement of reinforcing steel prior to, and in some specified instances during the placement of concrete structures, unless specifically noted otherwise.

B. Inspection shall include the following:

1. All structures:

    a. Size of all reinforcing bars.
    b. Measurement of bar laps.
    c. Spacing of reinforcing bars.
    d. Measurement of reinforcing concrete cover.
    e. Adequacy of reinforcement ties to prevent movement during concrete placement.
    f. Placement of reinforcing chairs, bolsters, and concrete blocks supporting reinforcement.
    g. Condition of reinforcing free of corrosion scale, grease, oil, and other foreign materials which would reduce bond of concrete to reinforcement.

2. Slabs-on-Grade:

    a. Nominal size of welded wire fabric.
    b. Measurement of fabric lap.
    c. Type, size, and spacing of supports for welded wire fabric.
    d. Adequacy of maintaining welded wire fabric in correct position during the concrete placement. If concrete workers walk on fabric during concrete placement, is fabric lifted back in to correct position prior to set of concrete. (THE TESTING LABORATORY SHALL BE PRESENT DURING THE PLACEMENT OF SLABS-ON-GRADE, WHICH USE WELDED WIRE FABRIC OR REINFORCING STEEL BARS).
    e. Slabs-on-grade with fibrous reinforcement do not require this inspection.

C. The Testing Laboratory shall report inspection results in writing to the Architect, Construction Manager, and Contractor the same day that tests are made. Reports shall indicate the specific structural items inspected and the location, with column grid references, where possible to clearly identify the inspected items.

D. Additional Inspections: Where inspections indicate deficiencies and concrete placement of any structural item is made without this required inspection, the testing laboratory shall conduct additional tests, including concrete coring, magnetic detection devices, sonic testing devices, and other methods as required to verify the conformance of the reinforcing steel placement to the Contract Documents. The Contractor shall pay for such inspections conducted and other additional inspections as may be required when unacceptable or un-inspected reinforcing steel placement is verified.

1.10 CONCRETE TESTING

A. The Contractor for the Work of Division 03 specification for “Cast-In-Place Concrete”, shall cooperate and coordinate with testing laboratory to perform field quality control testing during concrete work under Division 03.

B. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete, as follows:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.

2. Slump: ASTM C143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.

3. Air Content: ASTM C231, pressure method; one for every other concrete load at point of discharge or when the indication of change requires.

4. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below and when 80 degrees F. and above; and each time a set of compressive test specimens is made.

5. Compression Test Specimens: ASTM C31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

6. Compressive Strength Tests: ASTM C39, one set for each day’s placement exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

    a. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

    b. When the total quantity of a given mix design of concrete is less than 50 cu.yds., the strength tests may be waived by the Architect if, in his judgment, adequate evidence of satisfactory strength is provided.

    c. When the strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

C. The testing laboratory shall report test results in writing to the Architect, Construction Manager, Contractor, and ready-mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete, as directed by the Architect, when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Contractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.

E. Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement, which has slump or total air content outside the specified values.

1. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.

2. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.

   a. Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.

   b. When laboratory cured cylinder strengths are appreciably higher than the minimum required compressive strength, field cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even thought the 85 percent criterion is not met.

   c. If individual tests of laboratory cured specimen produce strengths more than 500 psi below the required minimum compressive strength or if tests of field cured cylinders indicates deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.

3. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.

F. Deficient concrete shall be removed and replaced by the Contractor without additional cost to the Owner.

1.11 CONCRETE MATERIALS AND MIX DESIGN

A. Concrete Materials and Mix Design: The Contractor(s) for Division 03 specification “Cast-In-Place Concrete” shall provide the following in conformance with the requirements of the Division 03 specifications:

1. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.

2. Product Data: Submit copies of manufacturer’s specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.

3. Laboratory Test Reports: Submit copies of laboratory test reports for concrete materials and mix design tests. The Architect’s review will be for general information only. Production of concrete to comply with specified requirements is the Contractor’s responsibility.

4. Mix Design: Submit copies of concrete mix designs for each type of mix required by the Concrete Schedule indicating the amount of each ingredient (by weight) in one cubic yard of concrete, the calculated water/cement ratio, and the slump.

B. Tests for Concrete Materials:

1. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.

2. For lightweight concrete, test aggregates by the methods of sampling and testing of ASTM C330.

    a. For portland cement, sample the cement and determine the properties by the methods of test of ASTM C33.

3. Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. Submit signed statement from ready-mix plant that concrete furnished for the Project will exactly conform to the approved design mixes.

1.12 TESTS FOR FF/FL (Refer to Division 03 specification for “Cast-In-Place Concrete”)

1.13 TESTS FOR MORTAR

A. The Contractor for the Work of Division 04 – “Unit Masonry”, shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Division 04 – “Unit Masonry”, unless specifically noted otherwise.

B. For colored and noncolored mortars test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.

1. Provide a minimum of one set of cubes for testing per 5,000 sq.ft. of masonry wall construction and as directed by Architect.

C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

D. If the compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.

E. Deficient mortar shall be removed and replaced by the Contractor without additional cost to the Owner.

1.14 TESTS FOR GROUT

A. The Contractor for the Work of Division 04 – “Unit Masonry”, shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under the Division 04 specification, which covers “Masonry Grout”, unless specifically noted otherwise.

B. Grout for filling reinforced or unreinforced concrete masonry cores or brick cavities test for compressive strength by methods as described in Division 04 section covering – “Masonry Grout”.

1. Provide a minimum of one set of 3 test specimens for testing per 5,000 square feet of masonry wall construction or for each ready-mix truck load of grout and as directed by the Architect.

C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the reference specification for each material, specific location where material represented by sample is used, slump and compression test results. Indicate whether or not material is acceptable for intended use.

D. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.

E. Deficient grout shall be removed and replaced by the Contractor without additional cost to the Owner.

1.15 TESTS OF CONCRETE MASONRY PRISMS

A. The Contractor for the work of Division 04 specification – "Unit Masonry", shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Division 04 specification – "Unit Masonry".

B. When required by the masonry plan, construct a set of 3 masonry prisms using mortar and concrete masonry units to be used in the masonry work. Unless otherwise noted, construct prisms 8 inches by 8 inches by 16 inches high (nominal) in compliance with ASTM E447, Method B.

C. When prism tests are required to establish the strength of masonry in lieu of Masonry Inspection, provide a minimum of one set of 3 masonry prisms for testing for each 5000 sq.ft. (gross) of masonry wall construction.

D. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, name of material suppliers, specific location where masonry represented by the prism is used, compression test strength results, and specified required strength.

E. If the compressive strength tests fail to meet the minimum strength specified in the Plans, the masonry represented by the tests shall be considered deficient.

F. When tests indicating deficient masonry represent masonry already constructed, such masonry shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

1.16 MASONRY INSPECTION

A. Provide masonry construction inspection of concrete or brick masonry walls to insure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements, which must be constructed to attain high design strengths.

B. Qualification of Inspection Agency: Refer to Section 014529 – "Testing Laboratory Service". Individual inspector shall be certified as a masonry construction inspector by the National Concrete Masonry Association or by a qualified state Masonry Institute or Association.

C. Inspection shall use NCMA-TEK 18-3 Quality Assurance as a guideline.

D. The individual or individuals who will perform the masonry inspection shall be present for the Pre-Masonry Conference.

E. The masonry inspector shall prepare a written report or reports for each day of inspection. The format for this report shall be furnished by the Owner's Representative upon request.

F. The masonry inspector shall be present and observe all masonry construction operations in walls requiring inspections. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

1.17 WELDING QUALITY CONTROL

A. Welding operators shall be qualified under the provisions of the AWS Structural Welding Code on test pieces in positions and with clearances equivalent to those actually to be encountered in construction. Welders shall make only those types of welds for which they are specifically certified.

B. Welds requiring inspection shall be so indicated in the Drawings.

1. Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect, prequalified by the American Welding Society Qualification Test.

C. The Contractor performing the welding requiring visual inspection shall coordinate with an independent testing service, acceptable to the Architect to perform weld testing.

D. Submit written reports for each weld tested. Provide project identification and number, date of report, name of Welding Contractor, name of testing service, location of weld, type of weld, and test results. Indicate whether or not weld is acceptable for intended use.

E. If by inspection welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced at no additional cost to the Owner.

1.18 BOLTED STRUCTURAL CONNECTIONS QUALITY CONTROL

A. The Contractor for the work of the Division 5 specification for *"Structural Steel"* shall cooperate with a separate testing laboratory, to perform field quality control inspection of slip-critical and snug-tight bolted connections.

B. Inspection of slip-critical connections shall be visual. The inspector shall be present at the beginning of steel erection to insure that the erector is conforming to the Contract Documents and AISC Specifications. The inspector shall verify that the erector is marking the bolts and nuts prior to the turn-of-nut procedure. Ten percent of all slip-critical bolted connections shall be observed as they are installed. Any connections, which, in the opinion of the inspector, do not meet the tightening requirements of the Contract Documents, shall be corrected by the erector.

1. Inspection of snug-tight connections shall be made by use of a spud wrench. Ten percent of all snug-tight bolted connections selected randomly over the entire limits of the building structure shall be tested to verify tightness. If more than 20 percent of the bolts tested do not meet the General Requirements of the Contract Documents, the erector shall be required to retighten all snug-tight bolted connections on the Project.

1.19 STRUCTURAL STEEL ALIGNMENT QUALITY CONTROL

A. The Contractor for the Work of the Division 05 specification section "Structural Steel", shall cooperate with a separate testing laboratory, to perform field measurement of structural steel beams, columns, joist, and deck alignment.

B. Alignment shall be measured and compared to AISC “Code of Standard Practice for Steel Buildings and Bridges”.

C. The Testing Agency shall submit, to the Architect, a written report summarizing the measurements performed and the equipment used in the fieldwork. Where alignment fails to meet AISC requirements, the Contractor for the work in “Structural Metal Framing” shall make the required corrections.

1.20 COLD FORMED METAL FRAMING QUALITY CONTROL

A. The Contractor shall cooperate with a separate testing laboratory to perform field quality control inspections.

1. Test and inspect cold formed metal framing used for exterior curtain wall system to verify framing meets the following specified and indicated items:

a. Thickness of framing members (gauge).
b. Spacing of framing members.
c. Attachment details of framing members to structural substrate.
d. Supplemental bracing and reinforcement are correctly provided including spacing, size and type of bracing and thickness of bracing.

1.21 FIRE RESISTANT PENETRATIONS & JOINTS QUALITY CONTROL

A. The Contractor shall cooperate with a separate testing laboratory to perform field quality control inspections in accordance with NYS BC 1705.17.

1. A pre-construction meeting shall take place to discuss the application of firestop protection systems including the coordination of work among trades and each contractor’s responsibility of the installation of firestop systems for the penetrations and joints.

2. The pre-construction meeting should address the following:

a. Agree on all the penetrations to be protected in accordance with the approved construction plans.
b. Schedule the trades work in conjunction with the firestop installation work.
c. Schedule the firestop inspections and coordinate with the firestop contractor work.

3. The Contractor shall cooperate with a separate testing laboratory to perform field quality control inspections. Major elements of quality firestopping inspections are as follows:

a. Firestop systems must not be concealed from view before being inspected and approved.
b. Walk through visual inspections should be made during the firestop installation.
c. When necessary or required, destructive evaluation will be made on various types of firestop systems.
d. Flashlights, coring device and other appropriate tools make a proper inspection easier.
e. Proper depths, annular space and product types are critical to the effectiveness of the system.
f. Construction documents detailing the firestop locations and systems must be kept on site to assist in the conduct of the inspection.
g. Observe that empty containers, wrappings or boxes of the specified materials are in sufficient quantity to have been installed correctly.
h. Observe that the actual products, containers, wrappings or boxes are labeled with the approved testing agency marks and are as specified in the submitted details.

i. Measure the depth and width of materials as indicated in the details (sometimes density measurements are also required for products such as thermal insulation).
j. Observe that joints have been installed in such manner that the required movement can be achieved (temporary screws used to hold studs to ceiling runners must be removed).
k. Compare the installed firestop system with the approved submitted details.
l. Observe a reasonable degree of workmanship, which would indicate compliance with the specified designs.
m. Deficient installations must immediately be corrected and then re-inspected before concealment.

1.22 PAINTING QUALITY CONTROL

A. The Contractor for the Work of Section 099000 – "Painting", shall cooperate with a separate testing laboratory to perform field quality control testing of painted finishes.

B. Wet Film Thickness:

1. Wet film thickness shall be tested at the rate of one reading per 1000 sq. ft. of painted surface. Ten random locations for readings will be chosen throughout building.

2. Wet film thickness shall be as specified in Section 099000 – "Painting"; or if not specified, as specifically recommended by the paint manufacturer for the type of substrate, type of paint and system used, and application methods and coverage requirements.

3. Testing Instrument:

a. Wet Film Thickness Gage, KTA-Tator, Inc., Pittsburgh, PA.

C. Dry Film Thickness:

1. Dry film thickness shall be tested at the rate of 5 readings per 100 sq.ft. of painted surface. Twenty random locations for readings will be chosen throughout the building.

2. Average of all readings for a given area or surface area to be within the dry film thickness range specified in Section 099000 – Paints, and no individual reading should be more than 20 percent below the specified dry film thickness.

3. Testing instruments; shall be destructive or nondestructive type applicable for the type of substrate the coating is applied to. The following lists acceptable types of testing instruments:

a. Type I, (Magnetic Pull-Off) Dry Film Thickness Gage, KTA-Tator, Inc., Pittsburgh, PA.
b. Fixed Probe Dry Film Thickness gage – Elcometer 345 Basic, KTA-Tator, Inc., Pittsburgh, PA.
c. Fixed Probe Dry Film Thickness Gage – Elcometer 345 Top, KTA-Tator, Inc., Pittsburgh, PA.
d. Fixed Probe Dry Film Thickness Gage Elcometer 300F-P2, KTA-Tator, Inc., Pittsburgh, PA.
e. Type II – Fixed Probe Dry Film Thickness Gage – Minitest 200F, KTA-Tator, Inc., Pittsburgh, PA.
f. Fixed Probe Dry Film Thickness Gage – Positector 6000-F1, KTA-Tator, Inc., Pittsburgh, PA.
g. Fixed Probe Dry Film Thickness Gage – Positector 6000-F3, KTA-Tator, Inc., Pittsburgh, PA.
h. Fixed Probe Dry Film Thickness Gage – Quanix 2200, KTA-Tator, Inc., Pittsburgh, PA.
i. Fixed Probe Dry Film Thickness Gage – Quanix 2300, KTA-Tator, Inc., Pittsburgh, PA.
j. Destructive Dry Film Thickness – Tooke Gage, KTA-Tator, Inc., Pittsburgh, PA.

1.23 STRUCTURAL TESTING AND SPECIAL INSPECTION CONFORMANCE IN COMPLIANCE WITH BUILDING CODE OF NEW YORK STATE

A. General: In addition to the above Division 02-33 general testing requirements, the provisions of Chapter 17, "*Structural Tests and Special Inspections*" of the *Building Code of New York State (BCNYS)* additionally governs the quality, workmanship and requirements for all materials, as applicable. Materials of construction and tests shall conform to the applicable standards listed in the BCNYS.

B. New Materials: New building materials, equipment, appliances, systems or methods of construction not provided for in the *BCNYS*, and any material of questioned suitability proposed for use in the construction of a building or structure shall be subjected to the tests prescribed in Chapter 17 of the *BCNYS*.

C. Used Materials: The use of second-hand materials that meet the minimum requirements of Chapter 17 of the *BCNYS* shall be permitted.

D. Special Inspections – All special inspections shall conform to the requirements of Section 1704 of Chapter 17 of the *BCNYS*. The Owner shall employ one or more Special Inspectors to provide inspections during construction on the types of work listed under Section 1704 of Chapter 17 of the *BCNYS*. The Special Inspector shall be a qualified person who shall demonstrate competence to the satisfaction of the code enforcement official for inspection of the particular type of construction or operation requiring special inspection. **Refer to Specification Section 014529, "Testing Laboratory Service" for the specific qualifications of the Special Inspector.**

E. Report Requirements: Special inspectors shall keep records of all inspections, and shall furnish said records to the code enforcement official, to the Architect and the Owner. If a Construction Manager has been retained by the Owner, all test results shall be submitted in quadruplicate, via the Construction Manager. Reports shall indicate that work inspected was done in conformance to the approved Construction Documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the code enforcement official and to the Architect, prior to the completion of that phase of the work. A final report of inspections documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted periodically at a frequency agreed upon by the Owner, the Architect and the Construction Manager, prior to the start of the work.

F. Inspection of Fabricators: Where fabrication of structural load bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be required by Section 17, and as required elsewhere in the *BCNYS*.

G. Fabrication and Implementation Procedures: The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to the approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.

H. Fabricator Approval: Special inspections required by the *BCNYS* are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon the review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At the completion of fabrication, the approved fabricator shall submit a certificate of compliance to the code enforcement official, stating that the work was performed in accordance with the approved construction documents.

SPECIAL INSPECTIONS & TESTS – The table below summarizes the special inspections & testing requirements of the contract, in conformance with BCNYS 1704.1.1. The Owner shall pay for all Special Inspections & Tests indicated below. (Note: This chart includes all items indicated within the BCNYS as requiring special inspections. These inspections shall be performed for all work items that are included within the project scope of work. If there is testing indicated for a material or component that is not required on the project, then it follows that there is no testing required for that item on the particular project in question.)

A. Soils				**1704.7**
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) **(Table 1704.7 – Required Verification and Inspection of Soils)**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BCNYS REFERENCE**
1. Verify materials below footings are adequate to achieve the design bearing capacity.		X		1704.7
2. Verify excavations are extended to proper depth and have reached proper material.		X		1704.7
3. Perform classification and testing of controlled fill materials.		X		1704.7
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X			1704.7
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.		X		1704.7
B. Foundation and Soil Investigations				**1802.2**
1. Questionable soil.	X			1802.2.1
2. Expansive soil.		X		1802.2.2
3. Groundwater table.		X		1802.2.3
4. Pile and pier foundations.	X			1802.2.4
5. Rock strata.		X		1802.2.5
6. Seismic Design Category C.		X		1802.2.6
7. Seismic Design Category D, E, F.		X		1802.2.7
C. Soil Classification		**X**		**1802.3**
D. Concrete Construction (per NYSBC Table 1704.4)				**1704.4**
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) **(Table 1704.4 – Required Verification and Inspection of Concrete Construction)**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD** (where applicable, see also Section 1707.1, special inspections for seismic resistance)	**BCNYS REFERENCE**
1. Inspection of reinforcing steel, including prestressing tendons and placement.		X	ACI 318; 3.5, 7.1-7.7	1913.4
2. Inspection of reinforcing steel welding, in accordance with Table 1704.3, Item 5B of BCNYS.			AWS D1.4, ACI 318; 3.5.2	
3. Inspection of bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.	X			1911.5
4. Verify use of required design mix.		X	ACI 318; Ch.4, 5.2-5.4	1904.2.2, 1913.2, 1913.3

5. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X		ASTM C172, ASTM C31; ACI 318; 5.6, 5.8	1913.10
6. Inspection of concrete and shotcrete placement for proper application techniques.	X		ACI 318; 5.9, 5.10	1913.6, 1913.7, 1913.8
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318, 5.11, 5.13	1913.9
8. Inspection of prestressed concrete: a. Application of prestressing forces. b. Grouting of bonded prestressing tendons in the Seismic-force-resisting system.	 X X		 ACI 318; 18.20: ACI 318; 18.18.4	
9. Erection of precast concrete members.		X	ACI 318; Ch. 16	
10. Verification of in-situ concrete strength prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs.		X	ACI 318; 6.2	
11. Inspect formwork for shape, location and dimensions of the concrete member being formed.		X	ACI 318; 6.1.1	
E. Pile Foundations: Installation and load tests.				1704.8
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) **(Table 1704.8 – Required Verification and Inspection of Pile Foundations)**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BCNYS REFERENCE**
1. Verify pile materials, sizes and lengths comply with requirements.	X			
2. Determine capacities of test piles and conduct additional load tests, as required.	X			
3. Observe driving operations and maintain complete and accurate records for each pile.	X			
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document and pile damage.	X			
5. For steel piles, perform additional inspections in accordance with Section 1704.3.				1704.3
6. For concrete piles and concrete filled piles perform additional inspections in accordance with Section 1704.4				1704.4
7. For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.				
8. For augured uncased piles and caisson piles, perform inspections in accordance with Section 104.9				1704.9
F. Pier Foundations: Seismic Design Category C, D, E, F				1704.9

INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) **(Table 1704.9 – Required Verification and Inspection of Pier Foundations)**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**
1. Observe drilling operations and maintain complete and accurate records for each pier.	X				
2. Verify placement locations and plumbness, confirm pier diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end bearing strata capacity.	X				
3. For concrete piers, perform additional inspections in accordance with Section 1704.4					1704.4
4. For masonry piers, perform additional inspections in accordance with Section 1704.5					1704.5
G. Masonry Construction					
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) L1 = Level 1 Inspection required for empirically designed & nonessential facilities. (Per NYSBC Table 1704.5.1)	**CONTINUOUS**	**PERIODIC**	ACI 530/ASCE5 / TMS 402, BCNYS Ch. 35	ACI 530.1/ASCE6 / TMS 602, BCNYS Ch. 35	**BCNYS REFERENCE**
1. As masonry construction begins, the following shall be verified, to ensure compliance:					
a. Proportions of site-prepared mortar.		X		2.6A	
b. Construction of mortar joints.		X		3.3B	
c. Location or reinforcement, connectors, prestressing tendons and anchorages.		X		3.4, 3.6A	
d. Prestressing technique.		X		3.6B	
e. Grade and size of prestressing tendons and anchorages.		X		2.4B, 2.4H	
2. The Inspection Program shall verify:					
a. Size and location of structural elements.		X		3.3G	
b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.		X	1.2.2(e), 2.1.4, 3.1.6		
c. Specified size, grade and type of reinforcement.		X	1.13	2.4, 3.4	
d. Welding of reinforcing bars.	X		2.1.10.7.2, 3.3.3.4(b)		
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)		X		1.8C, 1.8D	2104.3, 2104.4
f. Application and measurement of prestressing force.		X		3.6B	
3. Prior to grouting, the following shall be verified to ensure compliance:					
a. Grout space is clean.		X		3.2D	
b. Placement of reinforcement and connectors and prestressing tendons and anchorages.		X	1.13	3.4	
c. Proportions of site prepared grout and prestressing grout for bonded tendons.		X		2.6B	
d. Construction of mortar joints.		X		3.3B	
4. Grout placement shall be verified to ensure compliance with code and construction document provisions.	X			3.5	
a. Grouting of prestressing bonded tendons.	X			3.6C	

5. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X			1.4	2105.2.2, 2105.3
6. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.		X		1.5	
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) L2 = Level 2 Inspection required for essential facilities. See 1704.5 for clarification. (Per NYSBC Table 1704.5.3)	**CONTINUOUS**	**PERIODIC**	ACI 530/ASCE5 / TMS 402, BCNYS Ch. 35	ACI 530.1/ASCE6 / TMS 602, BCNYS Ch. 35	**BCNYS REFERENCE**
1. From the beginning of masonry construction, the following shall be verified to ensure compliance:					
a. Proportions of site-prepared mortar, grout and prestressing grout for bonded tendons.		X		2.6A	
b. Placement of masonry units and construction of mortar joints.		X		3.3B	
c. Placement of reinforcement, connectors and prestressing tendons and anchorages.		X	1.13	3.4, 3.6A	
d. Grout space prior to grouting.	X			3.2D	
e. Placement of grout.	X			3.5	
f. Placement of prestressing grout.	X			3.6C	
2. The Inspection Program shall verify:					
a. Size and location of structural elements.		X		3.3G	
b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	X		1.2.2(e), 2.1.4, 3.1.6		
c. Specified size, grade and type of reinforcement.		X	1.13	2.4, 3.4	
d. Welding of reinforcing bars.	X		2.1.10.7.2, 3.3.3.4(b)		
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)		X		1.8C, 1.8D	2104.3, 2104.4
f. Application and measurement of prestressing force.	X			3.6B	
3. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X			1.4	2105.2.2, 2105.3
4. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.		X		1.5	
H. Steel Construction (per NYSBC Table 1704.3)					
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) **(Table 1704.3 – Required Verification and Inspection of Steel Construction)**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD** (where applicable, see also Section 1707.1, special inspections for seismic resistance)		**BCNYS REFERENCE**
1. Material verification of high-strength bolts, nuts & washers:					
a. Identification markings to conform to ASTM standards specified in the approved construction documents.		X	Applicable ASTM material specifications. AISC 360, Section a3.3		
b. Manufacturer's certificate of compliance required.		X			
2. Inspection of high-strength bolting:					
a. Bearing-type connections.		X	AISC 360, Section M2.5		1704.3.3

b. Slip-critical connections.	X	X		
3. Material verification of structural steel:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.			ASTM A6 or A568	1708.4
b. Manufacturer's certified mill test reports.			ASTM A6 or A568	
4. Material verification of weld filler materials:				
a. Identification markings to conform to AWS specification in the approved construction documents.			AISC 360, Section A3.5	
b. Manufacturer's certificate of compliance required.				
5. Inspection of welding.				
a. Structural Steel:				
1) Complete & partial penetration groove welds.	X		AWS D1.1	1704.3.1
2) Multi-pass fillet welds.	X			
3)Single-pass fillet welds > 5/16"	X			
4) Single-pass fillet welds < 5/16"		X		
5) Floor and deck welds.		X		
b. Reinforcing Steel:				
1) Verification of weldability of reinforcing steel other than ASTM A706.		X	AWS D1.4, ACI 318:3.5.2	
2) Reinforcing steel-resisting flexural & axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls & shear reinforcement.	X			
3) Shear Reinforcement.	X			
4) Other reinforcing steel.		X		
6. Inspection of steel frame joint details for compliance with approved construction documents: a. Details such as bracing & stiffening. b. Member locations. c. Application of joint details at each connection.		X		1704.3.2
I. Wood Construction: Fabrication of wood structural elements & assemblies.				1704.6, 1704.2
J. Sprayed Fire-Resistant Materials				**1704.10**
1. Structural member surface conditions.				1704.10.1
2. Application.				1704.10.2
3. Thickness.			ASTM E 605	1704.10.3
4. Density.			ASTM E 605	1704.10.4
5. Bond Strength.			ASTM E 736	1704.10.5
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BCNYS REFERENCE**
K. Mastic and intumescent fire-resistant coatings			AWCI 12-B	**1704.11**
L. Exterior Insulation and Finish Systems (EIFS)				1704.12
M. Special Cases (unusual in it's nature)				1704.13
N. Smoke Control Systems (Ductwork)				1704.14
O. Special Inspections for Seismic Resistance: Applicable to specific structures, systems and components (Seismic Category C, D, E, F) **				**1707**
1. Structural steel (welding).	X		AISC 341	1707.2
2. Structural wood.	X	X		1707.3

3. Cold-formed steel framing.		X		1707.4
4. Pier Foundations a. During placement of reinforcement. b. During placement of concrete.	X	X		1707.5
5. Storage racks & access floors.		X		1707.6
6. Architectural components.		X		1707.7
7. Mechanical & electrical components.		X		1707.8
8. Designated seismic system verifications.				1707.9, 1708.5
9. Seismic isolation system.		X		1707.10
P. Structural Testing for Seismic Resistance: Applicable to specific structures, systems and components. (Seismic Category C, D, E, F) **				**1708**
1. Testing and verification of masonry materials and assemblies. (Level 1, 2 or 3)				1708.1
2. Testing for seismic resistance.				1708.2
3. Reinforcing and prestressing steel.			ACI 318, ACI 318:3.5.2	1708.3,
4. Structural steel.			AISC 341; AWS D1.1, ASTM A435, A898	1708.4
5. Mechanical & electrical equipment.				1708.5
6. Seismically isolated structures.			Section 17.8 ASCE 7	1708.6
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BCNYS REFERENCE**
Q. Structural Observations: Applicable to specific structures. (Seismic Category C, D, E, F) **				**1709**
R. Design Strengths of Materials			All design strengths and permissible stresses of any structural materials shall conform to the specifications and methods of design of accepted engineering practice or the approved rules in the absence of applicable standards.	1710.1
a. New Materials			For materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided for in Section 1711.	1710.2; 1711
S. Alternative Test Procedures			Provide duly authenticated reports from approved agencies in respect to the quality & manner of use of new materials or assemblies as provided for in Section 104.11. Costs of all tests and other investigations required under the provisions of this code shall be borne by the Owner.	1711.1
T. Test Safe Load				1712.1
U. In-Situ Load Tests (Completed Building or Structure)				1713.1, NYSBC

				Chapter 35
V. Preconstruction Load Tests (Structural Adequacy)				**1714**, NYSBC Chapter 35
a. Load Test Procedures specified				1714.2
b. Load Test Procedures not specified				1714.3
c. Wall and partition assemblies				1714.4
d. Exterior window & door assemblies				1714.5
e. Test Specimens				1714.6
W. Material & Test Standards				**1715**
a. Joist Hangers & Connectors				1715.1
b. Concrete and Clay Roof Tiles				1715.2
X. Misc.				
1. Fire Resistant Penetrations & Joints Fire Stops Testing for Smoke Control		X	Ch.7 ASTM E119 UL 263	1705.17 1705.18
Y. Other (List)				
End				

**** - For Seismic Classification, see Code Analysis located within the Construction Drawings.**
Note: For projects utilizing a Construction Manager, the Construction Manager's involvement with Special Inspections and Testing shall be limited to documenting, witnessing, acquiring and filing copies of all reports prepared by the Special Inspectors and testing agencies, and sequentially transmitting copies of the reports to the Architect and the Owner. All reports shall be prepared and certified by the Special Inspector and Testing Agency in accordance with criteria established by, and in a format approved by, the Architect/Engineer, in complete conformance with the requirements of BCNYS Chapter 17, Section 1704. Where no Construction Manager is retained, coordination and documentation of tests shall be the sole responsibility of the Prime Contractor responsible for the work being tested, in conjunction with the testing agency's Special Inspector.

1.24 QUALITY ASSURANCE FOR WIND REQUIREMENTS

A. Each of the main wind force-resisting systems that are identified within the construction documents are subject to special inspections and testing, in accordance with Section 1704 and other applicable sections of the Building Code of New York State.

B. Wind force-resisting systems include the following; (refer to construction documents for more specific information concerning systems contained within a specific project.)

1. Roof cladding and roof framing connections;

2. Wall connections to roof and floor diaphragms and framing.

3. Roof and floor diaphragm systems, including collectors, drag struts and boundary systems.

4. Vertical windforce-resisting systems, including braced frames, moment frames and shear walls.

5. Windforce-resisting system connections to the foundation.

6. Fabrication and installation of components and assemblies required to meet the impact resistance requirements of Section 1609.1.4 of the *BCNYS*.

Exception: Fabrication of manufactured components and assemblies that have a label indicating compliance with the wind-load and impact-resistance requirements of the *BCNYS*.

C. Special inspections and testing, observations, frequency and distribution of reports shall be as indicated within other areas of this section.

D. Contractor Responsibility: Each contractor responsible for the construction of a main wind force-resisting component listed in the quality assurance plan shall submit a written contractor's statement of responsibility to the code enforcement official and to the Owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:

1. Acknowledgement of awareness of the special requirements contained in the quality assurance plan;

2. Acknowledgement that control will be exercised to obtain conformance with the construction documents approved by the code enforcement official;

3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting, and the distribution of the reports;

4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

1.25 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE (Section 1707 of *BCNYS*)

A. Special Inspections for Seismic Resistance: Special inspection as specified herein is required for the following, where required in Section 1704.1 of *BCNYS*. Special inspections itemized in Sections 1707.2 through 1707.8 of the *BCNYS* are required for the following:

B. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F, as determined in Section 1616 of the *BCNYS*.

C. Designated seismic systems in structures assigned to Seismic Design Category D, E or F.

D. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C, D, E or F that are required in Sections 1707.6 and 1707.7 of the *BCNYS*.

E. For Seismic Classification specific to this project, see Code Analysis located within the Construction Drawings.

PART 2 – PRODUCTS – (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services performed on Work, repair damaged work and restore substrates and finishes to eliminate deficiencies including defects in visual qualities of exposed finishes. Except as otherwise indicated, comply with the requirements of the "Cutting and Patching" specification. Protect work exposed by or for service

activities and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of assignment of responsibility for inspection, testing or similar service.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 014529 – TESTING LABORATORY SERVICE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to Work of this Section.

1.02 SUMMARY

A. The Owner will pay for services of the independent testing laboratory. Source of services as well as payment and rates of payments will be as directed by the Owner's Representative. Testing specified in the Project Manual shall be performed at a minimum. Construction Manager or Architect may request additional testing which will be compensated as agreed upon between the parties.

B. Inspections and testing required by laws, ordinances, rules, regulations, or order of public authorities and General Conditions.

C. Certification of products and mill test reports: Respective Specification Sections.

D. Test, adjust, and balance of equipment.

E. Inspection, sampling, and testing: Soils, asphalt, concrete, steel, masonry, mortar, and grout, etc. and specified elsewhere.

F. Inspections, test, and related actions specified in this section and elsewhere in Contract Documents are not intended to limit contractor's quality control procedures, which facilitate compliance with requirements of Contract Documents.

G. Related work specified elsewhere:

1. Refer to Section 014523 – Tests, Inspections, and Special Inspections.

1.03 QUALIFICATIONS OF LABORATORY AND SUBMITTALS

A. Meet requirements of ASTM E329, current edition "Standards of Recommended Practice for inspection and testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction".

1. The term "agency" as used in Section 4 of ASTM E329 shall mean the local or closest office of said agency.

B. Laboratory qualifications for inspection, sampling, and testing of soils and aggregates shall be comparable to the requirements of ASTM E329.

C. Testing Equipment

1. Calibrated at maximum 12-month intervals by devices of accuracy. Traceable to either:

a. National Bureau of Standards

b. Accepted Values of Natural Physical Constants.

c. Submit copy of Certificate of Calibration, made by accredited calibration agency.

D. Submit documentation of specified requirements. Submit 2 copies to the Owner's Representative.

E. All testing and inspection performed by the testing laboratory shall be under the direct supervision of a Professional Engineer licensed in the state of the construction activities. This Professional Engineer shall submit a letter certifying that all testing services are in conformance with the standards and specifications as specified in these Contract Documents. The letter shall also certify that all tested and inspected items and procedures conform to the Contract Documents, except where specifically noted on the inspection reports.

F. All inspectors shall have at least one (1) year of experience performing the type of inspections to be performed on this project. Qualifications and experience of proposed inspectors shall be submitted to the architect for approval prior to the beginning of any testing.

1.04 QUALIFICATION OF SPECIAL INSPECTOR

A. The special inspector must have the expertise necessary to ensure compliance with the approved Construction Documents and referenced standards.

B. The special inspector, if an individual, should be a registered Structural Engineer or Professional Engineer specializing in structural engineering. If the special inspector is an agency, the agency should be under the responsible direction of a registered Structural Engineer or Professional Engineer specializing in Structural Engineering.

C. Special inspector qualifications (New York State Department of State, Technical Bulletin January 2003).

1. Reinforced Concrete: New York State Licensed Professional Engineer (PE) with relevant experience.

2. Prestressed Concrete: Pre-tension tendons and post-tension tendons: PE with relevant experience.

3. Welding: Current AWS Certified Welding Inspector.

4. High Strength Bolting and Steel Frame Inspection: PE with relevant experience.

5. Masonry: Current ICC Structural Masonry Certification and one (1) year relevant experience.

6. Sprayed Fire Resistant Materials: PE with relevant experience.

7. Excavation and Filling; Verification of Soils and Bearing, Piling and Drilled Piers, Modular Retaining Walls and Related Geotech: PE with relevant experience.

8. Inspection of Fabricators: Bar joist, metal building and structural steel – see welding requirements.

9. Exterior and Interior Architectural Wall Panels: PE with relevant experience.

10. Exterior Insulation and Finish Systems: New York State Registered or Licensed Design Professional.

11. Smoke Control: Expertise in fire-protection engineering, mechanical engineering, and

certification as air balancers.

12. Seismic Resistance: Refer to the applicable categories of this list.

NOTE: The list includes the word 'relevant' to describe experience for persons not holding formal certifications.

1.05 LABORATORY RESPONSIBILITIES, LIMITATIONS OF AUTHORITY

A. Provide qualified personnel promptly on notice.

B. Perform special inspections, sampling, and testing of materials and methods of construction.

1. Comply with specified standards; ASTM, other recognized authorities and as specified.

2. Ascertain compliance with requirements of Contract Documents.

C. Promptly notify Architect, Construction Manager, and Contractor of irregularities in the work to be performed in accordance with the Construction Documents and deficiencies of work performed which are observed during performance of services.

D. Promptly submit two (2) copies to the Construction Manager (one (1) to be turned over to Owner), two (2) copies directly to the Architect/Engineer and one (1) to the Contractor of reports of inspections and test, including the following information, as applicable:

1. Date issued.

2. Project title and number.

3. Testing laboratory name and address.

4. Name and signature of field inspector.

5. Date of inspection or sampling.

6. Record of temperature and weather.

7. Name and signature of laboratory inspector.

8. Identification of product and specification section.

9. Location in project.

10. Designation of the work and test method.

11. Observations regarding compliance with Contract Documents.

12. Complete inspection or test data.

13. Test results and interpretation of test results.

14. Recommendation on retesting.

E. Laboratory is not authorized to:

1. Release, revoke, alter, or enlarge on requirements of contract documents.

2. Approve or accept portion of work.

3. Perform duties of the Contractor.

1.06 INSPECTOR RESPONSIBILITIES

A. Notify the contractor of their presence and responsibilities at the job site.

B. Observe assigned work. The inspector shall inspect all work for which they are responsible for conformance with the plans and specifications. Perform inspection in a timely manner to avoid delay of work.

C. Report non-conforming items. Inspector shall bring all nonconforming items to the immediate attention of the contractor for correction. If any such item is not resolved in a timely manner or is about to be incorporated into the work, the Construction Manager and the Architect shall be notified immediately, and the item noted in the inspector's written report. The inspector shall write a separate report to be posted at the job site regarding noted discrepancies that should contain, as a minimum, the following information about each nonconforming item:

1. Description and exact location.
2. Reference to applicable plan sheets, details and specifications.
3. Resolution of corrective action taken and the date.

D. Provide timely reports. The Inspector shall complete written inspection reports for each visit to the site. These reports shall be organized on a daily format and will be submitted to the Construction Manager, Architect, and Contractor at the approved times and frequency. In the reports the inspector should:

1. Describe inspections and tests made, with applicable locations.

2. Indicate how nonconforming items are to be or were resolved.

3. List unresolved items, parties notified, time and method of notification.

4. Itemize changes authorized by the Architect.

E. Submit final report. Inspector shall submit a final, signed report to the Construction Manager and Architect stating that all items requiring inspection and testing were fulfilled and reported, and to the best of their knowledge, in conformance with the approved plans and specifications. Items not in conformance, unresolved items, or any discrepancies in inspection coverage (i.e., missed inspections, periodic inspection when continuous inspection was required, etc.) should be specifically itemized in this report.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall coordinate with independent testing agency performing inspections, tests, and quality control services.

1. Construction Manager will schedule services of independent testing to agency to perform services so specified.

B. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are the responsibility of the Contractor. Retesting of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests are performed on original

work. Retesting shall be performed by testing laboratory as directed by Construction Manager.

C. Responsibility of Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.

D. Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. Notify Construction Manager as required for all scheduling of times for inspections, test, taking of samples, and similar activities are contractor's responsibility.

PART 2 - MATERIALS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

General

1.1 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water Service and distribution.
3. Stormwater control within building
4. Sanitary facilities, including toilets, wash facilities, and drinking-waterfacilities.
5. Ventilation.
6. Electric power service.
7. Lighting.

B. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Tree and plant protection.
3. Site enclosure fence.
4. Security enclosure and lockup.
5. Barricades, warning signs, and lights.
6. Temporary enclosures.
7. Site road access and traffic control
8. Temporary partitions.
9. Fire protection.

C. Unless work of this section is indicated to be provided under a specific contract, Contractor must provide, maintain and remove required temporary facilities necessary to perform his own construction activities.

D. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.2 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.

4. NYS SED 155.5 Regulations

5. Police, fire department, and rescue squad rules.

6. Environmental protection regulations.
   Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations,” ANSI A10 Series standards for “Safety Requirements for Construction and Demolition,” and NECA Electrical Design Library “Temporary Electrical Facilities.”

7. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code.”

Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.3 PROJECT CONDITIONS

A. Temporary Utilities: Each contractor will prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-preventive measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

1.4 DIVISION OF RESPONSIBILITIES

A. General: These Specifications assign the Contractor responsibilities.

B. Each Contractor is responsible for the following:

1. Installation, operation, maintenance and removal of each temporary facility considered as its own normal construction activity, as well as the costs and use charges except as listed below.

2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.

3. Generator power for their own work.

4. Its own storage, lockable Conex boxes and fabrication sheds. (Locate/Move as directed by CM)

5. Hoisting requirements, including hoisting loads in excess of 2 tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure. (Rigging insurance must be provided when contractor hoisting equipment)

6. Collection and disposal of its own waste material.

7. Secure lock-up of its own tools, materials and equipment.

8. Construction aids PPE and miscellaneous services and facilities necessary exclusively for its own construction activities.

9. Maintaining temporary facilities provided by Contractor.

10. Containers for non-hazardous waste and debris generated by their own removals and construction operations.

1.5 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner, Architect or Construction Manager and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. The Architect and Construction Manager
2. Other Contractors.
3. Owner's construction forces, including testing agencies
4. Personnel of authorities having jurisdiction.

B. Water Service: Contractor needs to provide their own water connections to existing services.

C. Electric Power Service: Temporary electric power including set-up and maintenance is the responsibility of the Electrical Work Contractor. Use charges by owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. If acceptable to the Architect / CM, the Contractor may use undamaged, previously used materials in good condition. Provide materials suitable for use intended.

B. Lumber and Plywood:

1. For signs and directory boards, provide exterior-type, Grade B-B high density concrete form overlay plywood of sizes and thicknesses indicated.

2. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8- inch-thick exterior plywood.

C. Paint: Paint surfaces exposed to view from the Owner-occupied areas.

D. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

E. Temporary roofing: Minimum 1/2" Doug Fir 4- ply and 30 mil reinforced EPDM membrane.

2.2 EQUIPMENT

A. Water Hoses: Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

B. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve Protect adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.

B. Contractor shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

1. Arrange with utility company, CM, and Owner to make connections for temporary services.

3.2 CONTRACTOR FIELD OFFICES

A. Contractors may with permission from the construction manager establish a field office for their own use. Said offices for the individual contractor, sub-contractors, specialty contractors and the like shall be of such size and design as approved by the CM and shall be located in the Construction Managers designated area. Each representative contractor will arrange for telephone service and electric service, if required, directly with the utility company.

B. Maintain onsite, all articles for First Aid treatment. The contractor shall also establish standing arrangements for the immediate removal and hospital treatment of any employees and other persons on the job site who may be injured or who may become ill during the course work.

C. No space will be provided within existing buildings for use as a contractor filed office.

3.3 TEMPORARY AND PERMANENT SERVICES, GENERAL

A. The Contractor’s use of any permanent system or service of the building or portions thereof shall be subject to the Owners approval.

B. The Contractor shall be responsible for any and all damage to permanent services used and shall make good any and all damage to the satisfaction of the owner, prior to final completion and acceptance.

C. NOTE - In accordance with OSHA and other applicable regulations, the representative Contractors performing erection of structural “skeleton” type work are solely responsible for the netting, guard rail protection and such other safety devices as deemed necessary to protect the workers and public from harm.

3.4 TEMPORARY LIGHT AND POWER

A. Temporary Electric Power Service: Electrical Work Contractor shall provide and pay all costs to provide a weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period.

1. Responsibility: All work under this section to be provided by the Electrical Work Contractor.
2. Applicability: This section applies to all renovation and new construction work areas for this Project.
3. Electrical Work Contractor shall make arrangements with utility company for temporary and

permanent services immediately after award of contract.

4. Temporary services for temporarily or permanently installed building equipment such as sump pumps, boilers, cabinet heating and/ or cooling units and fans shall be furnished, installed, operated and maintained so that the said equipment may be operated for drainage and temporary heat when required and/ or when so ordered by the Construction Manager.

5. Electrical Work Contractor shall maintain all parts of the electrical system (temporary and permanent power) active and in-service at all times throughout the contract duration as governed by the Construction Manager. All temporary lighting to be controlled by standard switches per code (outside of power panels).

6. Electrical Work Contractor shall provide temporary generator power to maintain power during any electric service switch-over. This includes all electric service in the building (power, fire alarm, lighting, communication, information technology, kitchen freezers/coolers, heating units, etc.) Contractor shall assume generator(s) and temporary panels as necessary. Generators shall be located at the building exterior. Provide feeder cables, adequately sized, in accordance with NEC to feed temporary panels or existing sub-panels. Contractor shall include required fuel for operations.

7. Electrical Work Contractor shall maintain power during the hours established by Construction Manager.

8. Temporary Service: Install service and grounding in compliance with the National Electric Code (NFPA 70). Include necessary meters, transformers, overload protected disconnect and main distribution switch gear. Comply with all NECA, NEMA and UL Standards

9. Provide temporary service with an automatic ground-fault interrupter feature, activated from the circuits of the system.

10. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead. Rise vertically where wiring will be least exposed to damage from construction operations.

11. Provide metal conduit, tubing or armored cable for protection of temporary power wiring where exposed to possible damage during construction operations. Where permitted by code, wiring of circuits not exceeding 110-120 Volt 20 Amp rating and wiring of lighting circuits may be non- metallic sheathed cable in areas where located overhead and exposed. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide metal enclosures or boxes for wiring devices.

12. Provide overload-protected disconnect switch as required by code.

13. Maintain all existing systems, including but not limited to power, lighting, fire alarm, intercom, etc. within the existing building operational at all times for Owner occupancy and construction.

B. TEMPORARY ELECTRICAL AND TELEPHONE SERVICES

1. Temporary Power Source: At each building / renovation area, use the existing electrical power distribution system for temporary power source.

2. Owner's Requirements: Do not disrupt the Owner's needs for continuous power at each building.

3. Contractor shall provide temporary power and lighting facilities for use of all trades. All temporary light and power shall be in accordance with the required Codes and Safety Standards.

4. All other contractor trailer use / connection charges for power and telephone to be paid for by the respective contractor.

C. TEMPORARY POWER DISTRIBUTION

1. General Requirements: Contractor shall provide feeders and branch circuits of adequate size and proper characteristics as required to supply temporary receptacle and lighting loads. Size service and feeder conductors to restrict voltage drop to maximum 5 percent at 80 percent power factor. Provide properly sized overcurrent protection for each temporary electrical circuit.

D. RECEPTACLE REQUIREMENTS

1. General Requirements: Provide temporary receptacle outlets as required Minimum Requirements: Provide a minimum of one quad 120-volt receptacle per 250 square feet of building floor area, with maximum spacing of 50 feet on

   center for operation of portable tools and appliances during the construction period.

2. Branch Circuits: All temporary receptacle branch circuits to be rated 20 amps with a maximum of (3) duplex receptacles per circuit. Temporary receptacle branch circuits shall be independent of temporary lighting circuits.

E. LIGHTING REQUIREMENTS

1. General Requirements: Contractor shall provide both interior and exterior lighting at areas as required to provide adequate illumination for safe and proper construction operations and Project Site security.

2. Minimum Requirements: Provide illumination levels adequate for construction operations and safe traffic conditions. As a minimum provide one 200- w a t t lamp per 400 square feet of building floor area, with maximum spacing of 20 feet. Any rooms in excess of 500 sf will receive one 400-watt metal halide fixture for each 1000 sf of area. (or LED equivalents).

3. Supplemental Lighting: If required, supplemental lighting beyond minimum requirements shall be provided via suitable portable lighting units with cord and plugs, and shall be paid for by the Contractor or Sub-Contractor

   requiring such additional lighting.

4. Branch Circuits: All temporary lighting branch circuits to be loaded to a maximum of 1400 watts per 20amp circuit. Temporary lighting branch circuits shall be independent of temporary receptacle circuits.

5. Restrictions: Do not use permanent lighting systems for temporary construction lighting purposes.

F. MAXIMUM LOADS

1. General: Lighting and power loads connected to the temporary power distribution system shall be limited to the following maximum individual loads:

	Load Type	Maximum
a.		
b.	120 volt, 1-phase	1.5 KVA
c.	208 volt, 1-phase	2.5 KVA
d.	208 volt, 3-phase	5.0 KVA

2. General: The temporary power distribution system shall be sufficiently sized to provide temporary power as required within this section. Meter and Meter connections to be part of electrical contractors base bid.

G. ELECTRICAL WELDERS

1. Separate Power Sources Required: Power for electric welders and for other loads larger than the maximum allowable sizes shall be taken from portable power sources provided, paid for and operated by the Contractor or Sub-Contractor requiring the use of such equipment. Remove such power sources when no longer needed.

H. ELECTRICAL ENERGY COSTS

1. Paid by Owner: Charges for electrical energy usage for temporary power and lighting will be paid by the Owner, when taken from the Owner's electrical services. Contractor and Sub-Contractors shall exercise measures to conserve energy usage. Use of owner electric for items not specific to project (e.g. heating construction shanties, etc.) will not be permitted

3.5 TEMPORARY TOILET & SANITARY FACILITIES

A. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations which will best serve the project's needs. Existing facilities should not be used.

B. The Contractor is responsible for sanitary facilities at FLMB building location. These responsibilities include: maintenance, cleaning and supplies for use by all trades for the entire duration of the project. Sufficient quantity/locations to properly handle the number of workers onsite. (Minimum 1 per 10 employees) Provide separate toilet facilities for male and female construction personnel.

C. Supply and maintain toilet tissue, paper towels, paper cups and other disposable materials as appropriate for each facility,including Owner's Representative's temporary offices for full contract duration. Provide covered waste containers for used material.

D. Provide separate toilet facilities for male and female construction personnel.

E. Provide separate toilet facilities for Construction Manager personnel located at the direction of Construction Manager.

3.6 TEMPORARY HEATING

A. The Mechanical Work Contractor will maintain 60-degree temperature in all areas via temporary or permanent system.

B. The existing building heating system is to remain active for areas being Occupied by the district during the heating season 2026-2027. The existing piping system in the areas of work can be used as temporary heating but will likely need to be modified to allow for work to progress. Modifications would include, piping, controls, radiators, fans, etc. to distribute heating throughout the construction areas evenly. Surface, hung or mobile units may be necessary to allow for construction progress.

C. The Mechanical Work Contractor will submit a detailed plan including sketches indicating their proposed temporary heating system for Owner/Architect and Construction Manager approval within 4 weeks of contract award. The Electrical Work Contractor will provide permanent or temporary power for Mechanical Work Contractor’s units for temporary heating. The fuel, equipment, materials, operating personnel and methods used therefore shall be at all times satisfactory to the Owner, Architect and Construction Manager and adequate for the purpose intended. The use of electric heaters is not acceptable. All required fuel is part of the Mechanical Contract.

D. The Contractor shall maintain the critical installation temperatures provided in the technical provisions of the specifications herein for all work in those areas where same is being performed.

E. The maintenance of proper heating, ventilation and adequate drying out of the work is the responsibility of the contractor and any work damaged by dampness, insufficient or abnormal heating, shall be replaced to the satisfaction of the Architect by and at the sole expense of the contractor.

F. Before and during the placing of the gypsum and the application of other interior finishes, taping, varnishing, painting, etc. and until final acceptance by the Owner of all work covered by the Contract, the contractor shall, unless otherwise specified in the contract documents, maintain a temperature of 65 degrees F. Coordinate with Division 9 of the Technical Specifications.

G. Use of the permanent system if approved by engineer and owner permission granted, shall not shorten, or negate any equipment, or system guarantees required under this contract. (The warranty period starts upon date of substantial completion.) Two additional filter changes are to be provided by Mechanical Work Contractor. A program of use, maintenance and restoration will be submitted with request for use of systems of temporary services.

3.7 TEMPORARY WATER

Each Contractor shall handle their own temporary water services:

1. Provide and pay for all connections
2. Protect temporary and permanent lines against any damage.
3. Provide all hose and other extensions from connections installed by the Contractor and all labor, materials and supplies required to supply water to the work.
4. Prevent water damage to the work.

3.8 STORAGE FACILITIES

A. Contractor shall provide temporary storage and other facilities as required for their own use. Temporary structures shall be located at the Construction Manager's designated staging area and shall be removed upon completion of the work or when directed.

B. Materials delivered to the site shall be safely stored and adequately protected against loss or damage in watertight, environmentally controlled, lockable, Conex boxes. Particular care shall be taken to protect humidity/temperature sensitive materials (e.g. – wood doors, casework, ceiling tile, etc.) in the proper climate-controlled environment. All costs for properly storing materials is paid for by applicable contractor in their base bid.

C. Due to limited on site storage space, Contractor shall coordinate delivery of his materials with the Construction Manager who will determine when large deliveries shall be made and shall be designate storage locations on site for delivered materials. **All stored materials must be stored in locked, watertight trailers, paid for by applicable contractor.**

3.9 SCAFFOLDING AND STAGING

A. All scaffold, staging and appurtenances thereto shall comply in total to the requirements of Safety and Health Regulations for Construction Chapter XVII of OSHA, Part 1926 and all related amendments.

B. The General Work Contractor is to provide Covered Overhead Protections for the Egress Pathways, including Gate with Emergency Egress Panic Hardware, refer to Phasing and Logistics provided.

3.10 RUBBISH CONTAINER

A. Contractor shall provide suitable rubbish container device(s) for his own use, properly maintained and serviced, replaced as required and protected from access by the public fencing as may be specified herein or approved by the Architect or Construction Manager.

B. Contractor and Subcontractor shall sweep up and gather together daily all his own rubbish and removed materials and place same in containers.

3.11 CONSTRUCTION FENCING

A. Temporary construction fencing shall be of good quality and neat in appearance; 6’ high chain link fencing, 9 ga. fabric. Open-Mesh Chain Link Fencing: Provide 0.120-inch-thick, galvanized steel posts, (on stanchions at paved areas) and 2.875" dia. Gate posts. Provide lockable gates. (Keys to owner, architect and CM). Provide 10’ wide removable fence panels with roller, as shown on provided drawings.

B. Site access gates shall be provided as required, complete with all operating hardware and security devices.

C. Should fencing be required to be relocated or modified during the course of the project due to additional access needed by the contractor, same shall be done at the total expense of the contractor.

D. Contractor shall provide staging areas as per marked drawing at the end of this Section

a) In addition to the staging plan fencing, the Contractor shall provide an additional enclosure. 75’ x 75’x 6’ high on stanchions with 20’ gate to be located at the Construction Managers direction. (include all costs in base bid).

3.12 DAILY CLEANUP

A. Each Contractor shall furnish daily janitorial services for the project and perform any required maintenance of facilities as deemed necessary by the Construction Manager during the entire life of the contract. If any contractor fails to keep the site safe and broom clean within 4 hours of being notified by CM, either verbally or in writing, the construction manager will have the cleanup work performed by others and the contractors will be back charged accordingly.

1. In addition to the above, the Contractor shall provide a daily sweep and a weekly damp mop of all work areas.

3.13 BURNING

A. Burning will not be permitted.

3.14 FIRE PREVENTION CONTROL

A. Each Contractor shall comply with the safety provisions of the National Fire Protection Association’s “National Fire Codes” pertaining to the work and, particularly, in connection with any cutting or welding performed as part of the work.

3.15 TEMPORARY FIRE PROTECTION

A. Each Contractor shall take all possible precautions for the prevention of fires.

1. Where flame cutting torches, blow torches, or welding tools are required to be used, their use shall be as approved by the Construction Manager at the site.

2. When welding tools or torches of any type are in use, have available in the immediate vicinity of the work a fire extinguisher of the dry chemical 20 lbs. Type. The fire extinguisher(s) shall be provided and maintained by the Contractor doing such work.

B. Fuel for cutting and heating torches shall be gas only and shall be contained in Underwriters laboratory approved containers.

C. No volatile liquids shall be used for cleaning agents or as fuels for motorized equipment or tools within a building except with the express approval of the Owner and/or Architect and in accordance with local codes. On-site bulk storage of volatile liquids shall be outside the buildings at locations directed by the Owner, who shall determine the extent of volatile liquid allowed within the building at any given time.

D. Each Contractor shall comply with the following requirements relating to compressed gas:

3. Where compressed gas of any type is used for any purpose at the site, it shall be contained in cylinders complying with ICC regulations. Gases of different types shall not be stored together except when in use and when such proximity is required.

4. All persons required to handle gas cylinders or to act as temporary firemen (Fire Watchers) shall be able to read, write and understand the English language; they

shall also be required by the Contractor to read Part 3 of Pamphlet P-1 “Safe Handling of Compressed Gases” published by the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

E. Contractor shall comply with the following requirements relating to welding and cutting:

5. All cutting and/or welding (electric or gas) must be done only by skilled, certified and licensed personnel.

6. During welding or cutting operations, a contractor’s man shall act as a fire watcher.

The fire watcher shall have proper eye protection and suitable firefighting equipment including fire extinguisher (bearing current inspection Certificate), protective gloves and any other equipment deemed necessary.

7. Tanks supplying gases for welding or cutting are to be placed in an upright position securely fastened, and close as practical to the operation. Tanks, actives or spares, shall be protected from excess heat and shall not be placed in stairways, hallways or exits. When not in use, protective valve cap shall be screwed on the cylinder.

8. Adequate fire extinguishing equipment shall be maintained at all welding or cutting operations.

3.16 VENTILATION AND HUMIDITY CONTROL FOR CONSTRUCTION:

A. General Work Contractor will provide temporary ventilation as required for protecting the building from any adverse effects of high humidity during construction activities. Select dehumidification and ventilating equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements and have sufficient quantity of units to produce necessary ambient conditions.

1. **Interior Dust Mitigation & Environmental Protection / Plan** - The construction work will be taking place next to occupied area thus the Contractor will provide and maintain a strict negative air environment with machines of sufficient size/qty to properly ventilate the square footage of the work areas. Any dust/fumes must be exhausted through a flexible hose using a temporary up-blast fan to above roof to completely eliminate any vapors/odors/dust. This includes properly sealing windows, doors and openings to create a negative air environment. The contractor’s protection plan will be submitted in advance

and include a detailed and highlighted sketch of the program and a narrative explaining sequencing and procedures to insure no infiltration to other areas

2. Each Contractor shall be responsible for his own temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity.

3. Ventilate enclosed area to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

4. Provide equipment as necessary for air and fresh exchange for the work area per OSHA standards.

5. If Contractor fails to adequately ventilate the building during the construction process, thereby causing humidity and possible mold issues, the owner will hire others to properly address and deduct costs from the Contractor accordingly.

6. Contractor will provide negative air environment of sufficient size/qty to fully ventilate the square footage of work areas and exhaust any dust/fumes through flexible duct hose to exterior top eliminate any orders / smoke.

7. Any contractor allowing water infiltration to building is responsible for cleanup and commercial dehumidifiers of sufficient size/qty to prevent mold growth. Failure to immediately address (4 hours' notice) will result in the owners hiring others and back-charging in order to insure a safe environment.

3.17 TEMPORARY ROADS, TRACKING PADS, PARKING AREA AND CONCRETE WASHOUT:

1. **Temporary roads/ Parking Area /Tracking pad areas at each field location** will consist of one-layer soil separation fabric, 8" of 2" crushed stone. Contractor will maintain and field dress with additional material as necessary to prevent ruts and potholes.

2. Above work includes access / delivery to work areas, and to equipment and storage areas and sheds.

3. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust. Contractor must maintain dust control on a continuous basis.

4. Road Cleaning: Maintain roads and walkways in an acceptably clean condition. This includes the removal of debris daily, if required, and/or a minimum of once a week due to all project traffic. Road cleaning equipment to be wet/vacuum type. The Contractor will clean any construction-related dirt/debris from Town and State roadways as well as district access drives and parking lots throughout the duration of the project. Temporary parking by construction personnel shall be allowed only in areas so designated.

5. Contractor is responsible for all snow and ice removal for access to their work locations. This includes, temporary roadways, CM trailer and access to staging areas. Stockpile snow in areas as designated by Construction Manager.

6. Temporary parking by construction personnel shall be allowed only in areas so designated.

3.18 DE-WATERING FACILITIES AND DRAINS

A. Each Contractor is directly responsible for de-watering of their excavations. The responsibility of de-watering of the site as to facilitate the work will be the responsibility of the Sitework Contractor, coordinate with CM.

B. Comply with requirements in applicable Division 31 Sections for temporary drainage and de-watering facilities and operations not directly associated with construction activities included in individual

Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

C. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.

3.19 ROOF PROTECTIONS

A. All contractors shall provide temporary protection on the roof surface when it is necessary for work to take place on completed sections. (Minimum 2" Poly-Iso insulation and plywood)

B. Upon such notification as required in subparagraph A, the Contractor shall assume responsibility for damages, if any, to the roofing system caused by the work of other trades, except that financial liability for any and all damages rests with the offending trade.

3.20 TEMPORARY SITE SAFETY AND DIRECTIONAL SIGNS

A. The Contractor shall provide signs as required below. Install signs where required or indicated to inform public and persons seeking entrance to project. All signage and posts become the property of the owner at the conclusion of the project.

B. Construct signs in accordance with section 619 of the NYS DOT standard specifications (MUTCD overall sign size, letter size, metal signage). Support on breakaway metal posts or attach to fencing; do not attach signs to buildings or permanent construction.

C. Include relocating temporary site safety and directional signs as many times as required or directed.

D. For construction traffic control/flow at entrances/exits, as designated by the Owner (6 required) Large sign 4' x4' Orange with Black Letters ("Construction Entrance Only")

E. To direct visitors (4 required)

F. For construction parking (2 required)

G. To direct deliveries (4 required)

H. Emergency egress only – Construction area (4 required)

I. Per OSHA standards as necessary

J. For "No Smoking" safe work site at multiple locations (12 required)

K. Construction Area – Do Not Enter (30) mount on fence

L. No Trespassing (30) mount on fence

M. A premobilization meeting to establish location and quantities of all signage will be held with contractor, Construction Manager, and owner. Prior to the start of any actual work the signage must be reviewed / approved by the Construction Manager.

3.21 STORMWATER CONTROL

A. The General Work Contractor shall provide earthen embankments, silt fence, haybales, and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains during sitework activities.

3.22 BARRICADES, WARNING SIGNS AND LIGHTS:

A. Comply with standards and code requirements for erecting structurally adequate barricades. Paint

with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.

3.23 TEMPORARY ENCLOSURES

A. Contractor will provide temporary 2" x4" wood framing, 2" polyiso insulation, ½" plywood, and cover with 6 mil plastic; for any open exterior window removal, wall removal, door entrance locations, etc. created as part of their contract for weather and security protection at the end of each workday.

B. Any other temporary enclosures for specific openings for a contractor to perform their work are the responsibility of the contractor creating the opening and shall be installed to protect the building from exterior elements, security issues, odors / noise resulting from construction.

3.24 TEMPORARY DUST PARTITIONS and FLOOR PROTECTIONS

A. General Work Contractor shall erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate work areas from fumes.

1. Construct dustproof, floor to ceiling partitions of not less than 3-5/8" – 20 Ga. studs, 2 layers of 6 mil poly sheets inside / outside, sound batt insulation, exterior sheathing 3/4" plywood, interior sheathing 5/8" gypsum taped/painted where owner occupied. Caulk seal joints and perimeter to prevent dust migrations. Equip partitions with dustproof doors and security locks.
2. Cover floor with 2-layer poly and extend up the side 18". Overlap and tape full length joints
3. In addition to any temporary partition locations shown on attached drawing, General Contractor will include in his base bid 7 ea. 9' x12' temporary partitions meeting the above criteria for use where directed.
4. Temporary Floor Protections – Shall be "Ram-Board" **Heavy Duty** with taped joints or equivalent. Finish Flooring (new or existing) will be fully covered by GC. Areas of isolated MEP work will be protected with Ram- Board by the individual prime contractor
5. Any unfinished openings (e.g. – windows, doors fire shutters, etc.) which remain in place by the start of school in September will be completely enclosed with fire-rated AC plywood painted.

3.25 OPERATION, TERMINATION, AND REMOVAL

Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

Termination and Removal: Unless the Architect/ CM requests that it be maintained longer, remove each temporary facility when the need has ended or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been affected because of interference with the temporary facility.

Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractors property.
2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 015000 – TEMPORARY FACILITIES, CONTROLS & MISCELLANEOUS REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Provide, maintain, and remove when no longer required temporary services and utilities as specified, except as may be otherwise provided by the Owner; include costs of obtaining permits, labor, equipment, fixtures, lamps, and similar items as well as duties, levies, or taxes imposed.

1.02 SUMMARY

A. Section includes:

1. Construction facilities provided by the Contractor as required by the Contract:

    a. Temporary utilities:

        1) Temporary sanitary facilities.

    b. Construction aids:

        1) Temporary ramps, ladders, and runways.

        2) Material lifting equipment (i.e. hoists, cranes, and similar items).

        3) Temporary scaffolding and platforms.

    c. Barriers:

        1) Temporary enclosures and barricades, including protection for existing trees and plants to remain.

        2) Temporary enclosures and barricades within existing building.

    d. Controls:

        1) Construction cleaning and rubbish removal, including providing and maintaining rubbish chutes and rubbish containers.

        2) Dust control, erosion and sediment control, and noise, pest, and pollution control.

        3) Fire Protection and prevention.

    e. Other temporary equipment, facilities, controls, and similar items required to complete contract requirements or specified in other section of project manual.

2. Restoration of premises.

3. Cutting and Patching.

4. Rough Openings and Routine Items.

5. Water Tightness.

6. Miscellaneous Requirements.

B. Placement, Relocation, and Removal:

1. Unless otherwise directed by the Project Representative, locate construction facilities and temporary controls to avoid interference with the work of its project, future projects indicated in the Contract Documents, and the Owner's activities on site.

2. Should change in location of construction facilities and temporary controls be necessary, relocation shall be accomplished by the Contractor providing facility or control without addition cost to Owner.

3. When no longer required, each Contractor shall remove construction facilities and temporary controls provided by the Contractor and shall remove all debris and restore area to original conditions, unless otherwise indicated in the Contract Documents.

1.03 TEMPORARY UTILITIES

A. Sanitary Facilities: In accordance with the General Conditions of the Contract, the Contractor shall not permit any workers to use any of the Owner's existing facilities, including lavatories and toilets other than those designated by the Owner.

1. Temporary toilets: The Owner may allow the use of certain toilets within the building during the course of work. The Contractor shall maintain these toilets in sanitary conditions, and, upon the completion of the work, be responsible for removing the temporary toilets from the property if not provided by the Owner. If temporary toilets are provided by the Owner, the Contractor must surrender them to the Owner in as good condition as found.

B. In accordance with the General Conditions of the Contract, the Contractor shall provide and pay for all labor, materials, equipment and machinery, rigging, water, heat, utilities, light, transportation, and other facilities and services necessary for proper execution and completion of its work, whether temporary or permanent and whether or not incorporated or to be incorporated in its work.

C. Telephone Service: Owner's telephones are not available for use by Contractor personnel.

1.04 CONSTRUCTION AIDS

A. Installation and maintenance for construction aids in accordance with applicable New York State Labor Laws, OSHA regulations, and other federal, state, and local laws, and maintenance of construction aids in safe condition shall remain exclusive responsibility of the Contractor providing construction aid.

B. Ramps, Ladders, and Runways:

1. Comply with New York State Labor Laws, OSHA regulation, and other applicable federal, state, and local laws.

2. Remove as soon as possible and replace with permanent facilities where appropriate.

C. Material Lifting Equipment: Provide equipment as required complying with New York State Labor Laws, OSHA regulations, and other applicable federal, state, and local laws.

D. Scaffolding and Platforms: Provide equipment as required complying with New York State Labor Laws, OSHA regulations, and other applicable federal, state, and local laws.

E. Rubbish Chutes:

1. Install and maintain wooden to steel chute(s) terminating in hopper or rubbish container, properly fastened to building, and enclosed over full length with openings as required for access.

2. Provide protective covering for building wall beneath and at least 2 ft. on both sides of chute extending full length of chute.

1.05 BARRIERS AND ENCLOSURES

A. Interior Temporary Partitions and Closures: Provide temporary partitions and ceilings as required to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture from construction areas into Owner-occupied areas, and to prevent damage to existing areas and equipment.

1. Construction with steel studs and 5/8" thick Type ‘X’ gypsum board on both sides with taped joints.

2. Locate partitions as shown on drawings; if not shown on drawings, review location of partitions with the Architect and the Owner before beginning installation.

3. Partitions are to carry a minimum of a 1-HR fire rating and prohibit the passage of smoke.

4. Partitions shall not impede the existing exit routes and exit access.

B. Temporary closures and barricades, as may be required to maintain and protect the new and existing work and to protect the public from danger, shall be provided.

C. Protect temporary closures and barricades to guard new and existing work from vandalism during and after working hours.

D. Removal: Upon completion of construction at site, remove barriers, fencing, and closures/ enclosures, and patch existing surfaces to match adjacent undisturbed surfaces.

1.06 TEMPORARY CONTROLS

A. Construction Cleaning and Rubbish Removal:

1. Provide continuous cleaning of rubbish, construction debris, and waste material resulting from construction work; place rubbish chutes or covered containers, located convenient to the Contractor's construction areas as approved by Owner.

a. Definition of "rubbish, construction debris, and waste materials": Material not intended or necessary for completion of the project, including, but not limited to, such as packing materials, lunch papers, drinking cups, and similar items.

b. Frequency of cleaning: At least daily during construction, clean up rubbish, construction debris, and waste materials around bottom of chutes or containers, within structure, and around site and access routes.

c. Comply with local and state ordinances, regulations, and laws, and with OSHA anti-pollution laws regarding clean up and disposal operations.

d. Where surfaces are to be cleaned, use materials recommended by manufacturer.

e. Remove debris and rubbish from pipe chases, plenums, attics, and crawl spaces prior to closing space.

f. Vacuum clean interior areas prior to start of surface finishing and continuous cleaning as required as finishing progresses.

g. Control cleaning operations so that dust and other particulates will not adhere to wet or newly-coated surfaces. Sprinkle dust rubbish with water.

2. Lower waste material in controlled manner with as few handlings as possible; do not drop or throw from heights.

3. At least once a week, remove from site all rubbish, construction debris, and waste materials, including contents of containers, and dispose of legally.

a. Remove rubbish, construction debris, and waste materials more frequently if such materials present hazard or interfere with construction of other Contractors.

b. Do not burn or bury rubbish, construction debris, and waste materials on site.

c. Do not dispose of volatile fluid waste (i.e. mineral spirits, oil, paint thinner, and similar materials) in storm or sanitary sewer systems or into streams or waterways.

B. Dust Control: Provide methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.

C. Fire Protection and Prevention:

1. Each Contractor shall take all precautions required to prevent fires as a result of its operations.

2. Store volatile waste in covered metal containers and remove from premises daily in compliance with local and state ordinances and laws and with OSHA requirements.

3. Locate and maintain gasoline and fuel oil storage facilities in full compliance with local and state ordinances and laws with OSHA requirements.

4. Take all precautions required to prevent fires as a result of construction operations; operate flame cutting torches, blow torches, welding tools, and similar equipment in strict accordance with applicable safety rules and regulations.

a. Contractor using welding tools or torches of any type shall provide and maintain in usable condition at all times in the immediate vicinity of operations a fire extinguisher of the "Multi-Purpose Type ABC". The fire extinguishers shall be provided and maintained by said Contractor in usable condition at all times.

5. Each Contractor shall provide fire extinguishers in working order located at intervals throughout construction operations which shall not be removed from their mounting except to be tested or for purpose of fighting fire.

a. Relocate as necessary as work progresses.

b. Fire extinguishers remain the property of the Contractor providing them.

c. Keep fire hydrants on or adjacent to the work accessible to fire fighting equipment at all times.

D. Vehicle Parking: Locate vehicles used on project site in locations which will not introduce exhaust gases into portions of building occupied by Owner and not involved in the project.

1. Parking on site will be at the Owner's discretion and written approval only.

2. Protect existing roads and repair damage caused to road or site.

1.07 FIELD OFFICES AND SHEDS

A. Contractor's Field Offices and Sheds:

1. Each Contractor shall provide and maintain such offices, storage sheds, and similar temporary buildings and trailers on site as required for its own use.

a. Existing grass or paved areas at the site shall be designated by Owner as the Contractor staging area, including location of material storage and field offices: review requirements with Owner prior to moving onto site.

b. Contractors are advised that space within existing buildings will not be available for their use for storage of materials or similar uses.

2. Upon completion of construction at site, remove offices, storage sheds, and similar temporary buildings and trailers in site and patch existing surfaces to match adjacent undisturbed surfaces.

1.08 RESTORATION OF PREMISES

A. Walls and floor areas and any other surfaces that are broken, damaged, pitted, or otherwise defective as a result of receiving, handling, or storage of materials or the performance of any work under any Contract, or by reason of neglect of any Contractor, shall be fully restored to the satisfaction of the Owner, and the full cost, therefore, shall be borne by the Contractor.

B. Sites shall be cleaned daily and restored to original condition at completion of construction operations.

C. Roll-offs shall be located so as not to interfere with school operations, and paving or landscaping shall be restored when removals are completed.

1.09 CUTTING AND PATCHING

A. Cutting and patching covers adjustment to, necessary reworking, or removal of elements of construction in both new and existing work to comply with work of the Contract documents. The following definitions for cutting and patching apply:

1. Cutting: Physical modification or removal of construction work (walls, floors, ceilings, roofs, etc.) or installed materials (doors, windows, panels, etc.), both new, factory-finished, and existing.

2. Patching: Restoration or replacement of construction work (walls, floors, ceilings, roofs, etc.), both new, factory-finished, and existing. Patching shall include installation of new finish, materials, and reconstruction of walls, floors, etc. All patching shall match adjacent materials and finishes unless otherwise indicated.

B. Each Contractor, unless otherwise indicated, shall hire a qualified General Contractor to provide all equipment, labor, material, and incidentals necessary for cutting and patching as required for the installation of its work in new or existing walls, floors, and ceilings.

C. Each Contractor will be held responsible for its own and its Subcontractors' work in cutting and patching and the correction of the work of other Contractors if damaged by him.

D. Each Contractor shall bear the expense of all cutting, patching, repairing, or replacing of the work of other trades made necessary by any fault, error, or tardiness on the part of or damage done by him. He shall employ and pay the Contractor whose work is involved.

E. In existing structures, each Contractor shall, unless otherwise indicated, hire a General Contractor to do all cutting, patching, repairing, or replacing of General Work required for the removal of existing work or installation of its new work. Secure approval before cutting.

F. In no case may floors, walls, or ceilings that are waterproofed be cut for the admission of any equipment or materials nor may any structural member be pierced without written permission.

G. Where roofing or waterproofing membranes must be cut to accommodate the work of any Contractor, such Contractor shall employ a qualified roofing Contractor to do all required cutting, patching, and repairs of the roofing or waterproofing, and then only after approval of the methods proposed by the Architect and/or any agency that may have a roof bond or guarantee/warranty in force.

1. Approval of all materials, methods, and roofing Contractor used in cutting, patching, and repairing existing roofing membrane shall be obtained from agency, or agencies, holding a roof bond or guarantee/warranty in force.

1.10 ROUGH OPENINGS AND ROUTINE ITEMS

A. Each Contractor will provide all openings, chases, recesses, lintels, and bucks in new or existing construction that are required for the admission of its work.

B. Each Contractor shall furnish all necessary information (i.e. location and size of openings, chases, etc., and other built-in field conditions) to the other Contractors in ample time for the installation of its work.

1. Ample time shall mean:
   a. In concrete work, before reinforcing is placed.
   b. In masonry, before wall construction reaches location of opening, chase, or other item.
   c. In drywall, before second or finish face is applied.

2. This paragraph shall not be construed to include any items in earth such as trenches, etc.

1.11 WATER TIGHTNESS

A. Each Contractor shall be held responsible for the water tightness of its respective products, materials, and workmanship as installed in the job. This includes all work either specified to be watertight or inferred by general practice to be watertight. All walls, roofs, glazing, windows, doors, sleeves, through foundation or walls, flashings, and other items shall be in a watertight condition before final payment is requested.

B. If a Contractor feels that the details or materials, as drawn or specified, are not satisfactory to produce a watertight job, it shall inform the Architect before installation. The Contractor shall submit its proposed substitution or alternative method of doing the work for the Architect's approval. Any approved change shall be executed by the Contractor and made watertight at no additional cost to the Owner.

C. Any proposed changes encountered during the bidding procedure may be submitted in the proper form and time to the Architect for consideration as a change to be covered by ADDENDA to these specifications.

1.12 MISCELLANEOUS REQUIREMENTS

A. Contractor shall verify all existing conditions prior to proceeding with new work installations.

B. Contractor shall be responsible for all verification of dimensions shown.

C. Contractor shall retain all existing fire exit locations with the school complex during construction as necessary to provide safe egress to all inhabitants as per State and Local Codes.

D. Contractor shall seal all areas of construction to prevent dust and debris from entering areas other than location of installation.

E. Contractor shall meet all OSHA requirements for sanding and sealing as required.

F. Contractor shall protect all existing walls, equipment, and apparatus from damage during the construction process.

G. Contractor shall construct Architect/O.S.H.A. approved, code compliant barricades and construction area separation between all proposed work and student occupied spaces. There shall be no interference with required educational capabilities during the construction of this project while classes are in session.

H. Contractor shall relocate any existing H.V.A.C. intake/discharge units as to prevent the distribution of any demolition/construction related fumes and dust during the course of the entire project. Relocate same to original functioning position upon project completion.

I. All construction materials, equipment, personnel, debris, dust, fumes, noise, smells, etc. shall be isolated from building occupants and other vehicular traffic by way of "special necessary construction" during the entire construction process. provide all required temporary stairs, ramps, fire alarm systems, fire extinguishers, illuminated exit signs, door hardware, and floor finishes needed to maintain all occupied spaces safe and code compliant at all times.

J. Contractor must provide schedules of work which include a minimum of 48 hours or manufacturer's recommended time for "baking out" and exhausting of volatile organic compounds used during construction prior to building occupancy. Provide and maintain at the site "MSDS" forms indicating safe times before occupancy of spaces.

K. The District must provide a continuously updated written emergency exit plan which provides for the relocation of all students and staff immediately upon a break in the above required "separation of construction areas" as to minimize exposure to all students and staff. Coordinate with all contractors, building staff, and students for their use.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

Section 015600 CONSTRUCTION DUST CONTROL

PART 1: General - Contractor shall provide Construction Dust Control and IAQ Plan

1.1. Related Documents

A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Divisions -1 Specification Sections, apply to work specified in this section.

1.2. Summary

A. Section Includes:

1. Airborne construction dust/ containment control in:

a. Buildings occupied during remolding

b. Existing building temporarily unoccupied

c. Finished spaces that are unoccupied and construction dust/airborne containments are still being generated (i.e. punch list completion)

B. Related Sections:

1. Division 1 – Cutting and Patching

2. Division 1 – Electronic Submittal Procedures dust/airborne contaminants.

3. Division 1 – Temporary Facilities & Controls

4. Division 2 – Selective Demolition

1.3. Policy

A. Airborne contaminants control is critical in all areas noted in Paragraph 1.2A. Contractor shall limit dissemination of airborne contaminants produced by construction-related activities, including dust, chalk, powders, aerosols, fumes, fibers and other similar materials, in order to provide protection of persons and equipment.

1. Construction activities causing disturbance of existing dust, or other airborne contaminants, must be conducted in tight enclosures cutting any flow particles into occupied areas.

2. Ceilings, walls in Project area must be secure at all time.

1.4. Submittals

A. Progress Schedules: Submit work areas and procedure schedules for containment of construction dust/airborne contaminants.

B. Construction Indoor Air Quality Plan (IAQ): Narrative, Drawings and detail of extent of enclosures, construction of necessary temporary dust barriers and negative exhaust fans, and description of procedures to be used to achieve and maintain control of construction-related airborne contaminants.

1.5. General Access Procedures

A. No work is to be performed in Occupied Areas.

B. Duct Control Preconstruction Meeting: Before any construction on site beings, Contractor and workers are required to attend a mandatory dust control preconstruction orientation

session held by Construction Manager/Architect for training and instruction on precautions to be taken.

1. Conditions in construction area may be presumed to be in a condition similar to other existing surfaces or a survey of work area to record pre-existing damage may occur at this time.

C. Notification; Contractor shall notify Construction Manager / Architect a minimum of 48 hours prior to starting construction activity which might be expected to produce excessive construction dust and airborne contaminants in occupied areas so that additional precautions may be taken.

1.6. Testing

A. The Owner may provide the following test and observations:

1. Air Samples: Baseline particles count and conduct periodic air sampling of Project Areas during construction to monitor effectiveness of containment procedures.
2. Air Pressure: Using visual indicators, the maintenance of negative air pressure in Containment Area relative to Project Areas will be verified on a daily basis.

1.7. Definitions

A. Containment producing activities include, but are not limited to:

1. Demolition and removal of walls, floors, ceilings and other finish materials.
2. Demolition of plumbing, mechanical and electrical systems and equipment.
3. Finish operations such as saw cutting, shot blasting/grinding, sanding, painting, and application of special surface coatings.

B. Containment Areas: Includes area of construction, adjacent staging and storage areas, and passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.

C. Project Areas: Includes occupied areas adjacent to Project Area, either occupied or used for passage as well as areas connected to construction area by mechanical air system air intake, exhaust and ductwork.

PART 2: Products

2.1. Materials

A. Carpet or Mats: Provide carpets or mats at both sides of the containment entrances, vacuumed or change as often as necessary (minimum daily) to prevent accumulation of dust. All vacuuming outside areas not under negative pressure shall be with a certified HEPA-filtered vacuum.

B. Dust Caps: Block off all existing ventilation ducts within the construction area. Method of capping ducts shall be dust tight, withstand airflow and potential damage from construction activities.

C. Portable Enclosure: Whenever work is done outside existing barricaded work areas, provided 4 mil portable polyethylene enclosure capable of sealing off opening fitted tight to ceiling, or provide prefabricated unit.

D. Polyethylene: Polyethylene shall be fire retardant type listed by Fire Underwriter's Laboratories, Griffolyn #T55R WITH Griffolyn fire retardant tape, or equal.

E. Exhaust Fans / Negative Air Fans: Maintain continuous uninterrupted operation. Fans to have standard construction filtration prior to exiting the building. Filters to be maintained, cleaned and or replaced on a daily basis

PART 3: Execution

3.1. Inspection

A. Before any demolition or construction begins, a complete field review of all Project Areas (airborne contaminant control areas) and policies will be conducted and work plan revised if required. Initial work plan shall be presented at dust control preconstruction meeting.

3.2. Containment Enclosures and Barriers

A. Air Quality Contaminant Control: Fasten windows shut, ventilate partitioned construction areas by use of fans to the outside of building.

1. Maintain a minimum negative airflow of 3 Air Changes per hour with door fully open at construction entrance by use of negative air fans vented to outside of building.

2. Secure operable exterior windows and doors/windows not required for construction access as required to maintain negative airflow.

3. Provide additional local exhaust during welding.

B. Contractor shall install dustproof enclosures for work as submitted on work plan.

1. Construction must be conducted in tight enclosures cutting off any flow of dust particles into occupied areas.

2. The contractor shall provide additional dustproof enclosures as requested by the Owner when enclosure locations are not adequately containing the dust.

3. Provide all barricades, warning signs, and warning lights to protect the Occupants, the existing building, storage areas and materials or equipment.

C. Dust Partitions: See 015000 Temporary Partitions and Floor Protections - Full height, noncombustible construction, with minimum 5/8-inch type x gypsum board both sides with 3-1/2-inch R -11 insulation batts. Seal top, bottom, and all seams to prevent spread of dust to occupied areas, including above ceiling.

1. Doors as shown: 3’-0” minimum width (pair of 3’-0” wide doors as required by plans), solid core wood with metal frame and hardware, panic hardware if within occupied areas requiring such, hold open tied to Fire Alarm Systems, including closer, tightly weather-stripped to prevent flow of dust. Locate as directed and swing out of construction are (unless directed otherwise by fire marshal). Keep barriers locked outside of working hours. Provide signage at each door “Keep Door Closed.” Three keys for emergency access shall be furnished to the Owner.

2. Seal all penetrations, ductwork, piping, conduit, structure and miscellaneous penetrations in enclosure barricades.

3. Materials for barricade shall be precut in unoccupied areas.

D. Enclosure outside of work area (including spaces above ceilings): Whenever work is necessary outside of the construction area the space where work is being done, including ladders, shall be contained within full height enclosure. Contractor may use prefabricated unit.

1. All work performed outside the construction barricade shown on drawings including all work in corridors and lobbies shall be performed outside of normal working hours and shall be schedule in advance with Owner except where specified otherwise.

2. At no time shall any construction equipment or material be stored outside the construction area.

E. Furniture and Equipment Protection:

1. Cover all furniture and equipment remaining in the space with polyethylene. Seal with tape to prevent dust/dirt from reaching the furniture and equipment.

3.3. Procedures

A. General Work Contractor shall provide and maintain the Construction Indoor Air Quality Plan including all barriers, negative air systems, filters, ventilation, walk-off mats and cleaning and removal procedures as detailed in the work plan.

1. Traffic between work areas into Occupied areas is not allowed. Instruct workers to refrain from opening windows or doors allowing construction dust/airborne contaminants into adjacent occupied or finished areas. Any dust tracked outside of construction area shall be cleaned up immediately. Contractor shall have the necessary manpower and equipment (HEPA vacuum cleaners, dust and wet mops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all time. Keep door to such areas closed at all times. Transport materials and refuse into an area from an external site without violating occupied areas by transporting in covered containers.

2. Provide negative pressure in construction area by use of negative air system to the outside of the building. Block supply and return ventilation as to not recirculate air from construction area to air handlers suppling occupied areas. Rebalance air handling equipment to maintain correct airflow to occupied area.

a. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases in the building.

b. Direct exhaust from equipment away from building air intakes and operable windows; assure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants. Cover intakes of air handling equipment not in operation in proximity to exhaust locations.

B. Sealing of Openings: Use tape or other impenetrable sealant to seal barrier wall seams, crack around window and door frames, exhaust system ductwork, pipes, floor penetrations, joints and ducts. Seal or filter all open return and exhaust ductwork.

C. Dust Control: The Contractor shall take appropriate steps throughout the term of the Project to prevent airborne dust due to work under this contract. Water shall be applied wherever practical to settle and hold dust to a minimum particularly during demolition and moving of materials. No chemical palliatives shall be used without permission of the Owner's Representative.

1. Spray surfaces with water mist during dust- producing interior demolition activities. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA- Filtered vacuum cleaners and frequent wet-mopping during demolition and construction; project adjacent carpeted areas with plastic and plywood and vacuum with HEPA-filtered vacuum cleaners.

2. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.

D. Whenever access panels are opened in occupied areas, for work above ceilings, provide portable enclosure ladder and sealing off opening, fitted tight to ceilings.

E. Provide thorough cleaning of existing surfaces which become exposed to dust, before start of Owner's occupancy.

3.4. Final Cleaning

A. Removal of construction barriers shall be done carefully, and when necessary, outside of normal work hours. Remove all tape residue from existing/new surfaces. HEPA vacuum and clean all surfaces free of dust after the removal prior to Owner's occupancy.

B. Rebalance existing HVAC systems to restore modified systems back to the original design intent

3.5. Enforcement

A. Failure to maintain containment areas will result in issuance of written warning: if situation is not corrected within Four (4) hours of receipt of warning, Owner will have cause to stop the work as provided in the General Conditions of the Contract for Construction. All costs associated with Owner's written order to stop the Work and remobilization shall be borne by the Contractor.

CONSTRUCTION INDOOR AIR QUALITY (IAQ) PLAN

The **General Work Contractor** shall complete and submit this Plan no later than thirty (30) days after receipt of Notice to Proceed and not less than 15 days from the start of work.

General Work Contractor:

Name:_____ Title: _____

Telephone:_____ Fax:_____

Email:_____

I have read and understood and will implement the following Construction IAQ Plan

Signature: _____Date:_____

I. CONSTRUCTION DUST CONTROL AND VENTILATION

Provide a written narrative and plan associated with the required dust control and ventilation	
Required	• Dust Partitions as per the phasing and logistics plans included with specification section 015000 • Modify and/or Add Partitions as shown withing phasing and logistics plan • Floor Protections as required • Temporary ventilation/Negative Air Environment will be provided during all dust producing activities. See item I Construction Ventilation above. All supply air diffusers and return air grilles will be covered. • Negative Air Ventilation with filtration to provide no less than three air changes per hour. Negative Air Fans and System per floor or Work Area as needed. • Ventilation will be continuous for a period no less than 72 hours after completion of installation of any VOC emitting materials.

END OF SECTION 015600

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

1. Section 002113 – Instructions to Bidders
2. Section 004200 – Proposed Equivalent Form
3. Section 004300 – Proposed Substitution Form
4. Section 012300 – Alternates
5. Section 014219 – Applicable Standards

1.03 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," “assembly methods,” “manufacturer,” “brand,” “tradename,” or "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3. “Or Equal” Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

4. Reference to be approved equal or similar terms mean that approval of the Architect is required.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification. If the Contractor chooses to furnish an alternately named manufacturer or product, a substitution request must be made in accordance with Section 002113 and Section 004300.

1.04 SUBMITTALS

A. “Or Equal” Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Or Equal” Section 2.02 in this Specification.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section – 013300 – Submittal Procedures.

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section – 013300 – Submittal Procedures. Show compliance with requirements.

1.05 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.

2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.06 PROOF OF COMPLIANCE

A. Whenever the Contract Documents require that a product be in accordance with Federal Specifications, ASTM Designation, ANSI Specification, or other Association Standard, the Contractor shall present an affidavit from the manufacturer of a proposed product certifying that it complies therewith.

B. Where requested or specified, submit supporting test data to substantiate compliance.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather- protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.08 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017000 – Contract Closeout.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term “as selected,” sample to be matched is the Architect’s.
6. Where products are accompanied by the term “match existing,” sample to be matched is material adjacent.
7. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
8. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Or Equal” Section 2.02 in this Specification to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience may not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience may not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered if requested and documentation is submitted to Architect/ Engineer for review as required elsewhere in these specifications.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Or Equal Products" Section 2.02 for consideration of an unnamed product.

4. Manufactures:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered if requested and documentation is submitted to Architect/ Engineer for review as required elsewhere in these specifications.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Or Equal Products" Section 2.02 for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Or Equal Products" Section 2.02 for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Instructions to Bidders Section "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

1. Architect is permitted to require a custom color, at no charge to the Owner, when a standard or premium finish does not align with an existing color match or with the intent of the Architect's color palette selections.

2.02 "OR EQUAL" PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

2.03 INCLUSION IN SPECIFICATION OF NON-SPECIFIED PRODUCTS

A. If a Contractor has based his bid upon products, materials, or items not specifically described or named in the specifications, he may be required, prior to Award of Contract, to submit the names, types, brand, or manufacturer of products included in his bid for the specified items.

B. Supporting data documenting wherein the proposed materials, products, or equipment may vary from those specified may be required and will be the responsibility of the Contractor.

C. The risk of whether bid equivalents will be accepted will be borne by the Contractor.

2.04 CONSIDERATION OF EQUIVALENTS AFTER AWARD OF CONTRACT

A. Equivalent products will be considered after Award of Contract if:

1. Previously accepted or specified product is not available because of strike, lock out, bankruptcy, or discontinuance of its manufacture.

2. Specified performance or guarantee cannot be attained in the Contractor's judgement.

B. Additional products, when submitted for consideration, must be accompanied by documentation attesting to the foregoing and establish equivalency in the judgement of the Architect, the burden of proof for which shall be the Contractors.

C. Request for product changes, other than equivalents, if accepted, shall be affected by Change Order.

PART 3 - EXECUTION

Not used

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017000 – CONTRACT CLOSEOUT

1.01 CONTENTS

1. Scope
2. Punch List and Final Inspection
3. Operations and Maintenance Instructions
4. Project Closeout Documents
5. Emergency Repairs
6. Contractor's Guarantee

1.02 SCOPE

A. Prior to the release of final accrued retainage monies, the Contractor shall comply with the procedures for closing out the Construction Contract and to effect the project's transition to the Owner as summarized herein below.

1.03 PUNCH LIST AND FINAL INSPECTION

A. Preparation of Punch List:

1. When the Contractor determines that the project is substantially complete, he shall prepare a "Punch List" of the last items to be completed or corrected and shall notify the Owner in writing through the Architect that the project will be ready for a final inspection on a definite date which shall be stated in such notice. Such notification shall be given at least ten (10) days prior to the date stated for final inspection.

2. It shall be noted here, and emphasized, that preparation of the "Punch List" is a responsibility of the Contractor and not the Architect. The Architect's sole role will be that of an observer to assure that the design intent is carried out, and as an administrator of the Construction Contract.

3. The Contractor’s failure to include an item of deficiency on the punch list issued to the Contractor shall not relieve the Contractor of its responsibility to perform its work in accordance with the Drawings and/or Specifications, and as such, the punchlist may be revised, updated, and/or reissued at any time.

B. Review and Substantial Completion:

1. The Architect will review the Contractor's "Unacceptable and Non-Conforming Work List / Punch List" and on the basis of his inspection will verify the condition of substantial completion and prepare the Certificate of Substantial Completion.

C. Completion and Final Inspection:

1. Written notice shall also be given to the Architect by the Contractor upon completion of any work which, on the above stated final inspection, was determined to be incomplete, incorrect, or unsatisfactory and not to the stage of substantial completion. On receipt of such notice, additional inspection(s) will be made until completion of all contract requirements are effected. If the Architect is required to inspect the Contractor’s work more than twice, the Contractor shall be liable to the Owner for the services performed by the Architect as a result of additional inspections.

2. The final inspection is intended to be a last review to determine that the work included in the contract has indeed been executed in accordance with all of the Contract Documents. Requests to render a final inspection of an incomplete building or to prepare the Contractor's "Punch List" will not be honored.

1.04 OPERATIONS AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall start up, test, adjust, balance and otherwise place in a satisfactory working condition all items of mechanical and electrical systems, and shall fully instruct representatives of the Owner in the care and operation of such systems.

B. Instruction of the Owner's Maintenance Supervisor in the proper methods of cleaning and maintaining all the finished surfaces and the proper methods of replacement of the consumable items such as filters, light bulbs, washers, etc., shall be a part of this work.

1.05 CONTRACT CLOSEOUT DOCUMENTS

A. Prior to submittal of Final Application for Payments, the Contractor shall submit the following documents to the Architect:

1. Contractor's notarized affidavit that all payrolls, bill and materials, equipment, and other indebtedness connected with the work have been paid (AIA G706).

2. Notarized Certificates of Waiver of Liens for himself (AIA G706a), each Subcontractor, each material supplier or person furnishing materials or services to the project (AIA G706).

3. List of subcontractors and major material suppliers including address, telephone number, and name of individual to contact (AIA G705).

4. Validated warranties and notarized copies of all guarantees for equipment and materials specifically called for in the Contract Documents.

5. Consent of Surety to Final Payment (AIA G707).

6. Conformed Construction Drawings (As-builts), per section 017839.

7. Record digital copy of each shop drawing or installation diagram.

8. Operating manual (three (3) sets) assembled and bound, each containing:

    a. Explanatory brochures of all equipment.
    b. Catalog cut.
    c. Wiring diagrams.
    d. Instruction sheets for operation and maintenance.

9. Guarantees:

    a. Standard guarantee as per attached form.
    b. Additional specific guarantees required by Technical Section of Contract Documents.
    c. Manufacturer's warranties together with list of all items of equipment of material carrying warranty.

10. Attic Stock Receipts (where applicable). Refer to individual Specification Sections for requirements.

11. Fire Underwriters Certification (where applicable).

12. Asbestos Documents including Asbestos License, Transport, Manifest, Notifications & Logs (where applicable). Refer to Specification Section 028000.

13. In addition, Contractors shall refer to the Closeout Checklist following this section for additional requirements. Following the award of the contract the Architect will use this checklist to identify what items are required for Closeout of this project.

14. Contractor to submit a digital copy of all of the above documents in addition to hard copies as depicted.

B. Package all items properly indexed and deliver to Architect for review and transmittal to Owner.

1.06 EMERGENCY REPAIRS

A. During a valid warranty period, if the Contractor is unable or unwilling to respond immediately to make emergency repairs under conditions which the Owner may determine to be an emergency situation, the Owner reserves the right, and the Contractor recognizes such right, to make such emergency repairs and then to bill the Contractor for a fair and reasonable amount in reimbursement for such repairs.

1.07 CONTRACTOR'S GUARANTEE

A. The following two pages are the Contractor's Guarantee and shall be submitted along with the required Closeout Documents.

END OF SECTION

CONTRACTOR'S GUARANTEE

CONTRACTOR'S NAME AND ADDRESS

_____

_____

_____

OWNER'S NAME AND ADDRESS

_____

_____

PROJECT: _____

LOCATION: _____

CONTRACT FOR: _____

CONTRACT DATE: _____

The Contractor hereby guarantees that all Work performed and/or materials installed under the above referenced contract is of the quality that will comply with all specific requirements of the contract documents and hereby insures the Owner against all defects of material for two (2) years and workmanship for a period of two (2) years from and after the date of Final Payment. This does not waive stipulation of other clauses which specify guarantee periods in excess of the obligations herein.

It is further agreed that if, after due inspection, the Architect, as provided in the General Conditions of the Contract for Construction, shall decide that the replacement or repair of any of the Work is, in his opinion, necessary, such defective Work will be repaired or removed and replaced with New Work, meeting all requirements of the Contract Documents, same being done promptly and without expense to the Owner. Repairs and replacements are to include all costs of replacing or repairing other work damaged by the removal and replacements of the work covered by this guarantee and all costs necessary for restoring any portion of the building and its contents which are damaged due to defects in this Contractor's Work or materials.

The Contractor agrees to perform all corrective work necessary promptly upon receipt of written notification from the Owner unless the Owner has previously given the Contractor a written acceptance of such condition.

The Contractor stipulates and agrees that if he fails or neglects to carry out promptly the provisions of this guarantee or any part thereof, the Owner may cause all defects to be remedied and all repairs to be made without further notice to the Contractor and shall charge to and recover the expense thereof from the Contractor and/or Sureties.

Such decisions as the architect shall render in connection with this guarantee are subject to the provisions of the General Conditions.

CONTRACTOR: CORPORATE SEAL:

BY: _____

DATED: _____

STATE OF NEW YORK, COUNTY OF _____ ss:

On the _____ day of _____, 20___, before me personally came _____ _____, to me known, who being by me duly sworn, did depose and say that he resides at _____ _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of said corporation, and that he signed his name thereto by like order.

STATE OF NEW YORK, COUNTY OF _____ ss:

On the _____ day of _____, 20___, before me personally came _____ _____, to me known, and known to me to be the individual described in, and who executed the foregoing instrument, and _____ acknowledged to me that _____ executed same.

_____

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CLOSEOUT CHECKLIST

Line	Item	Required	Responsible	Date Complete
1	Change Orders & Allowances Fully Executed	☒	BBS	
2	UNC/Punch List Issued	☒	BBS	
3	SED Certification of Substantial Completion Issued	☒	BBS	
4	Final Inspection Performed	☒	BBS	
5	DOL Wage Rate Completion Form	☒	BBS	
6	Final Payment Application	☒	Contractor	
7	Release of Liens from Prime Contractor (AIA G706a)	☒	Contractor	
8	Affidavit of Payment Prime Contractor (AIA G706)	☒	Contractor	
9	List of Subcontractors and Suppliers (AIA G705)	☒	Contractor	
10	Release of Liens from Subs & Suppliers (AIA G706a)	☒	Contractor	
11	Consent of Surety to Final Payment (AIA G707)	☒	Contractor	
12	Contractor's Guarantee (017000)	☒	Contractor	
13	As-Built Drawings (017839)	☐	Contractor	
14	O&M Manuals (017000)	☐	Contractor	
15	Record Copy Submittals (017000)	☐	Contractor	
16	Attic Stock Receipt (various individual sections)	☐	Contractor	
17	Maintenance Bond (General Conditions)	☐	Contractor	
18	Electrical Inspection Certificate (017000/260810)	☐	Contractor	
19	Fire Alarm NFPA 72 System Record of Completion (284613/E0.01)	☐	Contractor	
20	Equipment Guarantees/Warranties (017000)	☐	Contractor	
21	Demonstration/Training Proof (various individual sections)	☐	Contractor	
22	HVAC Testing & Balancing (230593)	☐	Contractor	
23	Elevator Inspection (142100/142200)	☐	Contractor	
24	Cx Report (230800)	☐	Contractor	
25	Asbestos License, Transport, Manifest, Notifications, Logs (028000)	☐	Contractor	
26	Lead Renovation, Repair & Painting (RRP) Certification (029000)	☐	Contractor	
27	NYSDEC 375 Clean Fill Certification (310000)	☐	Contractor	
28	Public School Fire Safety Report	☐	Third Party	
29	Controlled/Special Inspection Results	☐	Third Party	
30	Asbestos License, Clean-Air, CoC, Location Plans, Lab Accreditations	☐	Third Party	
31	Lead Clearance Wipe Tests	☐	Third Party	
32	Lead in Water Test (New Faucets)	☐	Third Party	
33	SWPPP Notice of Termination	☐	Third Party	
34	Certificate of Occupancy	☐	AHJ	

Notes:

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1. SUMMARY

A. This section includes procedural requirements for cutting and patching.

B. Related sections include the following:

1. Division 02 through 28 sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
    a. Requirements in this Section also apply to Mechanical and Electrical installations associated with this project.

C. Division of Responsibilities for Cutting and Patching Work: Contractor shall perform cutting and patching required for its portion of the work.

1.2. DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other work.

1.3. SUBMITTALS

A. Cutting and Patching Plan: Where approval of procedures for cutting and patching is required before proceeding (see Article 1.4 below), submit a proposed plan describing procedure at least 14 days before the time cutting and patching will be performed requesting approval to proceed. Include the following information, as applicable, in the proposal:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to existing construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in buildings appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involved adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect’s Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4. QUALITY ASSURANCE

A. Minimize cutting and patching of work by properly coordinating construction sequences with Architect.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
   1. Obtain Architect's approval before cutting and patching any structural work that is not indicated on drawings.

C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   1. Obtain Architect's approval before cutting and patching any operational element that is not indicated on drawings.

D. Miscellaneous Elements: Do not cut and patching the following elements or related components, that are not indicated on drawings, in a manner that could change their load-carrying capacity, that results in increased maintenance or decreased operation life or safety.
   1. Water, moisture, or vapor barriers.
   2. Membranes and flashings.
   3. Equipment supports.
   4. Piping, ductwork, vessels, and equipment.
   5. Noise and vibration-control elements and systems.

E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCT

2.1. MATERIALS

A. General: Comply with requirements specified in other sections of these specifications.

B. OSHA approved systems, equipment, scaffolding, PPE, lanyards, rigging, etc.

C. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1. EXAMINATION AND SAFETY

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions are corrected.

3.2. PREPARATION

A. Temporary Support: Provide temporary support of work to be cut.

B. Roof Water Tightness – Contractor must ensure that proper weather conditions, protections, and manpower are present prior to cutting existing roof areas. Contractor is responsible for any interior damages with any direct/indirect costs which accrue if they fail to maintain water tightness.

C. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection for any portions of project that might be damaged/soiled during cutting and patching operations.

3.3. PERFORMANCE

A. General: Each trade shall employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition(s).
   2. Related Electrical and Mechanical work will be performed by licensed subcontractors.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Existing Finished Surfaces: Cut or drill from exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Mechanical and Electrical Services: By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Each trade shall patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other sections of these specifications. Utilize workers who are authorized/skilled in the discipline to be patched (e.g.-mason, carpenter, painter, etc.)
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where portions of walls or partitions that are removed extend on finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch, from wall-to-wall or corner-to-corner. Provide additional coats until patch blend with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide and even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.4. CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely: paint, mortar, oils, putting and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 017329

SECTION 017423 – CLEANING UP - BUILDING

PART 1 - GENERAL

1.1. DESCRIPTION OF THE WORK

A. The work of this section relates to the following:
   1. Maintain all premises and public properties/roadways free from accumulation of waste, debris, dirt, mud and rubbish caused by operations on a daily basis.
   2. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight exposed surfaces; leave project clean and ready for occupancy.
   3. Remove all overspray caused by construction operations from adjacent construction, surfaces and vehicles

B. Related Requirements Specified Elsewhere
   1. Division 1, Summary of Work: Section 011000
   2. Cleaning for Specific Products or Work: the respective sections of the Specifications.

1.2. SAFETY REQUIREMENTTS

A. Standards: Maintain project in accord with safety and insurance standards.

B. Hazard Control/Cleaning Products
   1. Store volatile waste in covered metal container and remove from premises daily.
   2. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
   1. Do not burn or bury rubbish and waste materials on project site.
   2. Do not dispose of volatile waste such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   3. Do not dispose of waste into streams or waterways.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

PART 3 – EXECUTION

3.1. REQUIREMENTS DURING CONSTUCTION

A. Execute daily cleaning to ensure that the building, grounds, and public properties and roadways are maintained free from accumulations of waste materials, rubbish, dirt, mud and dust.

B. Moisten dry materials and debris to suppress and prevent airborne dust.

C. Each day, all contractors shall adhere to the following:
   1. Areas of intense activity, such as cutting and sawing must be swept clean and reorganized at the end of each day. Utilize dust control methods such as plastic containment, containment hut and/or wetting of surfaces.

2. Areas of moderate activity such as installation of plumbing, ductwork, electrical work must be returned to good order at the end of each day.
3. Debris below scaffolds (and shoring/re-shoring) must at all time, be kept sufficiently consolidated to keep walkways free of tripping hazards. These work areas must also be swept clean immediately upon removal of scaffolds.
4. All swept up debris, waste materials, and packing must be removed and placed in the dumpster by the end of the workday.
5. All stored material must be protected and kept in good order.
6. As portions of the work are completed, all used and excess materials must be removed promptly.
7. Daily clean-up and good housekeeping are the responsibility of contractor individually and will be monitored by the Construction Manager. If contractor fails to perform cleaning when directed or does not properly clean within 4 hours of being notified by Construction Manager, the owner will hire others and charge contractor accordingly.
8. Contractor shall promptly comply with requests to organize scattered materials.

D. Contractor is responsible for furnishing all dumpsters or other such containers as required for collection, storage and legal disposal of all debris and rubbish resultant from their construction operations. The Construction Manager shall locate and request to move such containers as necessary and legally dispose of waste as containers are filled. Separate and recycle as required authorities and regulations.
E. Vacuum clean areas when ready to receive finish painting, and continue vacuum cleaning on an as needed basis until building is ready for Substantial Completion or occupancy
F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
G. Schedule cleaning operations so that dust and other containment resulting from cleaning process will not fall on wet, newly painted surfaces.

3.2. FINAL CLEANING

A. Contractor shall:
1. Employ professional cleaners for final cleaning.
2. In preparation for substantial completion or occupancy, conduct final inspection of all exposed interior and exterior surfaces, and of concealed spaces.
3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surface so designated to shine finish
4. Maintain cleaning until project, or portion thereof, is occupied by owner.
5. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
6. If the contractor fails to perform final cleaning when directed or does not properly clean within 4 hours of being notified by Construction Manager, the owner will hire others or perform the cleaning with their own work force and charge contractor accordingly.

B. General Contractor shall complete the following restoration operations before requesting inspection for certification of Substantial Completion for entire Project or portion of Project:

1. Restoration of any lawn and walk/curb areas disturbed by construction operations. This includes repairs of any ruts / damage created by Heavy Equipment, Lulls, Cranes, etc.
2. Hire professional cleaning company (not construction tradesmen) to thoroughly clean all surfaces, including glass, floors, carpeting, ceramic tile, doors, windows, casework, etc.
3. Clean and wax Resilient floors using the exact same products / coats as the owner's custodial staff for compatibility purposes. Vacuum all carpet areas.
4. Power sweep all asphalt areas using a commercial street sweeper (water method).
5. Remove any stickers, protective coverings, etc.
6. Clean all materials & equipment etc. inside and out.

C. Mechanical Contractor shall complete the following cleaning operations before requesting final inspection for certification of Substantial Completion for entire Project or portion of Project:
   1. Clean all mechanical units, including removal of any stickers, protective covering. Wipe down all of surface.
   2. Vacuum out all ductwork, grills / louvers to insure there is no construction debris or dust.
   3. Replace all air filters at no additional cost immediately prior to owner occupancy.

D. Electrical Contractor shall complete the following cleaning operations before requesting final inspection for certification of Substantial Completion for entire Project or portion of Project:
   1. Clean surfaces of all electrical equipment from any dust. Remove any labels or protective films.
   2. Replace any burned out or non-functioning bulbs.

3.3. RUBBISH REMOVAL

A. Contractors shall comply with all Local, State and Federal Laws, Codes and Requirements regarding recycling and trash or rubbish removal.

END OF SECTION 017423

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017423 – FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Each Contractor shall at all times during the progress of the work keep the building and site free from accumulation of rubbish.

1. This includes broom sweeping with compound, vacuuming as required and removal of all trash daily. All Contractors shall provide this daily cleanup. Failure to comply with cleaning requirements will initiate the Owner to provide cleaning as required, all costs associated with this expense shall be backcharged to the individual Contractor or Contractors.

B. Each Contractor shall provide final cleaning of those areas of site and structure (exterior and interior) involved in the work of his respective contract immediately before final inspection.

1.02 PROTECTION AND CONTROL

A. Fire Protection:

1. Store volatile waste removed in final cleaning in covered metal containers, and remove from premises to comply with local and/or state ordinances and OSHA.

2. Gasoline and fuel oil storage facilities shall be located and maintained in full compliance with local and/or state ordinances and OSHA.

B. Pollution Control:

1. Conduct clean up and disposal operations to comply with local ordinances and/or state ordinances and OSHA anti-pollution laws.

2. Burning or burying of rubbish and waste materials on the project site is not permitted.

3. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

A. Use only cleaning materials recommended by manufacturer or surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Post signs to advise building occupants if wet and/or slippery floor conditions exist during cleaning operations.

3.02 FINAL CLEANING

A. General:

1. Use experienced workmen, or professional cleaners, for final cleaning.

2. Maintain cleaning until the building, or portion thereof, is occupied by the Owner.

B. Remove grease, dirt, dust, stains, labels, fingerprints, paint drips and runs, plastic coverings, tape, glue and other foreign materials, from interior and exterior surfaces.

C. Do not move dust from spot to spot. Remove directly from the surface on which it lies by the most effective mean such as appropriately treated dusting cloths or vacuum tools. When doing high cleaning, do not allow dust to fall from high areas onto furniture and equipment below.

D. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.

E. Clean resilient and hard surface floors as recommended by manufacturer.

F. Clean surfaces of equipment; remove excess lubrication.

G. Clean plumbing fixtures and toilet rooms to a sanitary condition.

H. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.

I. Remove waste, foreign matter, and debris from roofs, gutters and downspouts, areaways, and drainage systems.

J. Dismantle and remove all temporary structures, scaffolding, fencing, and equipment.

K. Remove waste materials, rubbish, lumber, block, tools, machinery, and surplus materials from site. Clean grounds; remove stains, spills and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.

L. Perform the following prior to final payment:

1. Broom clean all exterior concrete surfaces and vacuum clean all interior concrete surfaces.
2. Dust and spot clean painted and vinyl covered walls.
3. Clean and polish all unpainted metal on doors such as trim, hardware, kickplates and doorknobs.
4. Vacuum clean carpets, mats and similar soft surfaces.
5. Vacuum clean acoustic ceilings.
6. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
7. Remove foreign material from exterior masonry.
8. Replace all broken and scratched glass and mirrors.
9. Replace all damaged insect screens.
10. Wash and clean interior and exterior window surfaces. All glass shall be clean and free of dirt, grime, streaks and excessive moisture. Wipe drippings and other marks from windowsills, sashes and woodwork. Do not use windowsills in lieu of ladders.
11. Clean furniture and equipment in accordance with manufacturers instructions.
12. Clean all paved roads, lots and drives which were paved as work under this Contract and all existing paved surfaces using a mechanical street cleaner.
13. Repair or repaint damaged pavement markings.

14. Vacuum and clean with a damp cloth light fixtures, including glass and plastic lenses, ceiling and wall mounted lights, cover panels, side panels, louvers, fixture frames and lamps.
15. Clean supply vents and exhaust grilles.
16. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
17. Clean and polish all new toilet facilities constructed under this project.
18. Wash all existing floors that were in any way impacted by the construction operations.
19. Rake clean landscaped surfaces. Final mow all areas grassed and sodded during the work.
20. Inspect interior and exterior surfaces, and all work areas, to verify that the entire work is clean and ready for use by the Owner. The project will not be considered substantially complete until all final cleaning has been performed.
21. Fill in all holes in concrete that remain after temporary handrail is removed. Non-shrink grout shall be used.
22. Elevators: Clean all interior surfaces of the car including hoistway doors and services of the corridors on the side of the elevator. Polish all bright metal surfaces. Clean and spray buff resilient tiles. Dust and damp wipe elevator cab doors, walls and bright work.
23. Clean kitchens and kitchen equipment in accordance with Health Department requirements.

END OF SECTION

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.

1.2. SUMMARY

A. This section includes administrative and procedural requirements for contract closeout including but not limited to, the following:
  1. Substantial Completion & Inspection procedures.
  2. Project record documents.
  3. Operation and maintenance manual submittal.
  4. Start-up and adjustments.
  5. Spare Parts.
  6. Demonstration & Training.

B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.3. SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following. List exceptions in the request.
  1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete.
    a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.
  2. Advise the Owner of pending insurance changeover requirements.
  3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  4. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
  6. Deliver tools, spare parts, extra stock, and similar items.
  7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner’s personnel of changeover in security provisions.

8. Complete startup testing of systems and instructions of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements. Startup of existing removed/replaced rooftop HVAC units will include written confirmation from contractor's mechanical subcontractor that all systems are adjusted and functioning properly.
9. Complete final cleanup requirements, including touch-up painting.
10. Touch up and otherwise repair and restore marred, exposed finishes.

B. Initial Inspection: Conducted between Construction Manager and Contractor, once all incomplete items identified are completed, a request for review by the Architect shall be made.

C. Inspection Procedures: On receipt of a Request for Inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Architect will conduct a re-inspection upon request, provided the work is substantially complete. If multiple inspections are required due to the contractor's failure to complete the work, the resulting costs will be charged to the Owner and deducted from the contractor through a change order.
2. Results of the complete inspection will form the basis of requirements for final acceptance.

1.4. FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for Certification of Final Acceptance and Final Payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, endorsed and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Architect.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. All items in the Construction Checklist must be received and approved prior to any retainage reduction.

B. Re-Inspection Procedure: The Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been complete except for items whose completion is delayed under circumstances acceptable to the Architect.

1. Upon completion of re-inspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance. Note that multiple inspection due to Contractor not being complete will result in a charge to the Owner in which the amount shall be deducted from said Contractor via change order.
2. If necessary, re-inspection will be repeated, but may be chargeable to the Owner and back-chargeable to the Contractor in conditions within his control.

END OF SECTION 017700

SECTION 017701 – CHECKLIST FOR PROJECT CLOSEOUT AND PROCESSING OF FINAL PAYMENT

PART 1 - GENERAL

1.1. FINAL PAYMENT

Final payment will not be processed until all items indicated are received in accordance with Section 017701 – Checklist for Project Closeout.

1.2. **CLOSE-OUT SUBMITTALS**

One (1) bound, hard cover, 3-ring binder:

[ ] Contractor's Affidavit of Payment of Debts and Claims: AIA G706.
[ ] Contractor's Affidavit of Release of Liens: AIA G706A with:
[ ] Separate AIA G706A for subcontractors, suppliers, and others with lien rights against the property of owner, together with a list of those parties.
[ ] Consent of Surety to Final Payment: AIA G707.
[ ] Operation and Maintenance Manuals for all equipment installed on the project.
[ ] As-Built Drawings (1 full-size hard copy).
[ ] Fully executed Certificate of Substantial Completion: AIA G704.
[ ] Contractor's written warranty and extended warranties as required by the Contract.

Two (2) complete electronic copies (thumb drives) of the following:

[ ] All items listed above.
[ ] Typed or printed instructions covering the care and operations of equipment and systems furnished and installed.
[ ] Manufacturers instruction books, diagrams, spare parts lists covering all equipment.
[ ] Instruction of Owner's Representative in care and maintenance of new equipment.
[ ] All approved shop drawings.
[ ] Certificates of compliance and inspection (where applicable – electrical, elevator, etc.).
[ ] Spare parts and Maintenance Materials (receipt signed by ACCI & Owner).
[ ] Evidence of compliance with requirements of governing authorities (Certificates of Inspection, Waste Manifests).
[ ] Certificates of insurance for products and completed operations.
[ ] Notarized statement that only non-asbestos materials were installed on this project.
[ ] Maintenance bond as per the requirements of the Contract.
[ ] Project Record Documents.

NOTE: Retainage reduction are allowed as outlined in the Contract.

END OF SECTION 017701

SECTION 017719 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1. SUMMARY

A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and project specifications.
B. All Contractors, Subcontractors, Sub-Subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2. REQUIREMENTS

A. Project Record Drawings
B. Record Drawing Certification

1.3. PROJECT RECORD DRAWINGS

A. The purpose of the project drawings is to record the actual location of the work in place including but not limited to underground lines, concealed piping within buildings, concealed valves and control equipment, and to record changes in the work.
B. In addition to the above, these drawings shall be "color-coded", by each trade, on a daily basis to indicate progress of the work. Color legend will be assigned by the Architect.
C. In addition to the sets of contract drawings that are required by the Contractor on the site to perform the work, the Contractor shall maintain, at the site, one (1) copy of all drawings, specifications and addenda that are part of the Contract as awarded.
D. Each of these documents should be clearly marked "Project Record Copy", maintained in a clean and neat condition available at all times for inspections by the Owner, Construction Manager or the Architect, and shall not be used for any other purpose during the progress of the work.
E. The Construction Manager will be the custodian on the project record documents until the end of the Project.
F. Project Record Requirements
  1. The Contractor shall mark-up the "Project Record Copy" to show:
    a. Approved changes in the work.
    b. Location of underground work and completed work.
    c. Details not shown in the original Contract Documents.
    d. Any relocation of work including piping, conduits, ducts and the like.
    e. All changes in dimensions.
    f. All access doors and "tack" location access points in accessible ceilings.
    g. Location of all plumbing, heating, ventilating, air conditioning or electrical assemblies, whether existing to remain or newly installed.
    h. Revisions to any electrical circuitry.
  2. Such information shall include, but shall not be limited to:

a. Footing depth in relation to finished grade elevations.
b. Any change in floor elevations.
c. Any structural changes.
d. Any substitutions
e. Elevations and locations of all underground utilities, services, or structures referenced to permanent above ground structures and monuments.
f. Designation of all utilities as to the size and use of such utilities.
g. All invert elevations of manholes.
h. The location of all utilities, services and appurtenances concealed in building structures that have been installed differently from that required by the Contract.
i. Any approved change orders.
j. Other such data as required by the Architect and/or Owner to establish a complete record of "As-Constructed" conditions.

G. The Contractor shall keep the project record documents up to date from day to day as the work progresses. Appropriate documents are to be updated promptly and accurately; no work is to be permanently concealed until all required information has been recorded.

H. The project record drawings are to be submitted by the Contractor to the Architect through the Construction Manager when all the work is completed and is approved by the Owner and the Architect before the Contractor may request final payment.

I. If the project record drawings as submitted are found to be unacceptable due to incompleteness or inaccurate information, the drawings shall be returned to the responsible Contractor for corrective action and resubmitted for approval prior to the release of final payment.

J. The Contractor shall submit all approved Shop Drawings of the Work as installed.

1.4. RECORD DRAWING CERTIFICATION

A. The record drawings required under the terms and conditions of this Section shall be reviewed and processed by each of the Prime Contractors as part of their overall contractual responsibility.

B. This certification may be issued for individual trades as a collective document to cover the entire record drawing requirements of the project.

The format of this certification shall be as follows:
The record drawings prepared by:

_____

for _____ have been reviewed by the undersigned and:

Appears to be an accurate representation of the work incorporated within the project and are accepted as submitted in accordance with the technical documents.

This record document review made by this office is for determination of compliance to the requirements of the Contract Documents.

Firm Name: _____

Review Date: _____ By: _____

END OF SECTION 017719

SECTION 017823 – OPERATION AND MAINTENANCE REQUIREMENTS

PART 1 - GENERAL

1.1. SUMMARY

A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the project specifications.
B. All Contractors, Subcontractors, Sub-Subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.2. REQUIREMENTS

A. Startup and Demonstration
B. Parts List
C. Operation and Maintenance Data

1.3. STARTUP AND DEMONSTRATION

A. The work required herein consists of starting up and demonstrating all systems and equipment to operating personnel and includes training of said operating personnel.
B. The respective Trade or Subcontractor shall make arrangements, via the Construction Manager and/or the Owner (with notification to the Architect), as to whom the instructions are to be given in the operation of the basic and auxiliary systems and the period of time in which they are to be given.
C. As specified in individual sections, furnish the services of instructors to train designated personnel in adjustment, operation, maintenance, and safety requirements of equipment and systems. If procedures are not specified for specific items of equipment, follow that recommended by the item manufacturer.
D. Instructors shall be thoroughly familiar with the equipment and systems and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given after the equipment or system has been accepted and turned over to the Owner. The duration of instruction shall be as specified in individual sections but shall be not less than two (2) days of each portion of operating mechanical/electrical systems. Use Operating and Maintenance Data as a training guide.
E. The Architect shall be completely satisfied that the Owner's designated representatives have been thoroughly and completely instructed in the proper operation of all systems and equipment before final payment is made. If the Architect, Owner, or Construction Manager determines that complete and thorough instructions have not been given by the Contractor to the Owner's Representative, then the offending Contractor shall be directed by the Architect to provide whatever instructions are necessary until the intent of this paragraph of the Specification has been complied with as determined by the Architect.

1.4. PARTS LIST

A. As required, the respective Trade or Subcontractor shall furnish instructions for the ordering and stocking of spare parts for all equipment installed. The lists shall include parts numbers and suggested suppliers. Each set shall also include an itemized list of component parts that should be kept on hand and where such parts can be purchased.

1.5. OPERATION AND MAINTENANCE DATA

A. The Contractor shall submit to the Architect for approval of all instructions for the installation, operation, care and maintenance of all equipment, fixtures and systems.
- **1.** Provide typed or printed label identifying binder as operating and maintenance data. List title of project, contract number, and location of equipment.
- **2.** Furnish manufacturer's printed data or sheets neatly typewritten on 8-1/2 inch by 11-inch, 20-pound minimum white paper. Provide indexed tabs.
- **3.** Drawings: Bind in with text. Provide reinforcement rings. Fold larger drawings to the size of the text pages.
- **4.** Information shall indicate possible problems with equipment and suggested corrective action.
- **5.** See Specification Section 017701 Project Record Documents for additional instructions.

1.6. CONTENT OF MANUAL FOR EQUIPMENT AND SYSTEMS

A. The instructions shall contain information deemed necessary by the Architect and include but not be limited to the following:
- **1.** Introduction:
  - **a.** Explanation of Manual and its use.
  - **b.** Summary description of all mechanical and electrical and equipment operating systems.
  - **c.** Purpose of systems.
  - **d.** Maintenance scheduling summary analysis, sheets and software operating instructions and diskette(s).
- **2.** System:
  - **a.** Detailed description of all systems.
  - **b.** Illustrations, schematics, block diagrams, photographs and other exhibits.
  - **c.** Complete wiring diagrams, tabulations and installation drawings.
  - **d.** Valve tag charts and control diagrams.
  - **e.** ½ size reduced copy of "Record Drawings"
- **3.** Operations:
  - **a.** Complete detailed, step-by-step, sequential description of all phases of operation for portion of the systems, including startup, shutdown, adjusting and balancing, and emergency procedures. Include all posted instruction charts.

4. Maintenance:
   a. Parts list and parts number.
   b. Maintenance, lubrication and replacement charts and Contractor's recommendations for preventative maintenance.
   c. Troubleshooting charts for systems and components.
   d. Instructions of testing each type of part.
   e. Recommended list of on-hand spare parts.
   f. Complete calibration instructions for all parts and entire systems.
   g. Instructions for charging, filling, draining and purging.
   h. General or miscellaneous maintenance notes.
5. Manufacturer's Literature:
   a. Complete listing for all parts with names, addresses and telephone numbers.
   b. Care and operation.
   c. All and other pertinent brochures, illustrations, drawings, cuts, bulletins, technical data, certified performance charts and other literature with the model actually furnished to be clearly and conspicuously identified.
   d. Internal wiring diagrams and engineering data sheets for all items and/or equipment to be furnished.
   e. Guarantee and warranty data.
6. Instruction for lubricating each piece of equipment installed. Instructions shall state type of lubricant, where and how frequently lubrication is required.
7. Frame all instructions under glass and hang in the Mechanical Room or other location as directed by Architect.

1.7. MANUALS FOR PRODUCTS, MATERIALS, AND FINISHES

A. Submit three (3) copies of complete manual.
B. Content: Provide complete information for Architectural products, applied materials, and finishes.
   1. Manufacturer's data, including catalog number, size, composition, color and texture designations, and information for reordering.
   2. Instructions for care and maintenance, including manufacturer's recommendations for cleaning agents and methods; cautions detrimental cleaning agents and methods; and recommended schedule for cleaning and maintenance.

END OF SECTION 017823

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 GENERAL

A. Submit Conformed Construction Documents as required by Section 017000 herein specified and obtain written receipt from Architect.

B. Each Contractor shall, upon completion of the construction work, furnish the Owner with three (3) paper sets and two (2) electronic copies (both AutoCAD and PDF electronic files) of Conformed Construction Documents.

1. The Contractor shall either use and reproduce the documents they are entitled to via the contract or they shall request and pay for additional sets from the Architect.

a. Electronic drawing files, AutoCAD format, may be available, at the discretion of the Architect, for a cost of $25.00 per drawing. Contractors requesting this service will be required to sign a disclaimer. Request for electronic files must be made in writing to the Architects office. This request must include a specific list of drawings required in this format. In response, the architect will verify the drawings requested and will forward the disclaimer for signature. Electronic files will be released upon receipt of payment and a fully executed disclaimer. Payment shall be made by check, payable to BBS Architects, Landscape Architects & Engineers, P.C.

2. Incorporate all changes due to addenda modifications, change orders, field conditions and record actual locations of all items clearly and neatly with all changes bubbled or highlighted. Print each drawing, whether or not changes and additional information were noted. Submit prints when requested by the Architect for interim approval. Review may be made periodically during the job.

3. Each Drawing shall be dated and include the designation “PROJECT RECORD DRAWING” clearly and prominently located.

C. The Architect will review Conformed Construction Documents prior to transmittal to Owner. If in the Architect’s opinion, the submitted Conformed Construction Documents are lacking or inadequate, the Contractor shall revise and resubmit accordingly.

1.02 BUILDING CONSTRUCTION AND RECONSTRUCTION

A. General Construction:

1. Incorporate plan changes, structural changes, and general building layout changes. For buried construction, include tie dimensions.

B. Mechanical Construction:

1. Incorporate ductwork and revisions/re-routing, registers and diffusers, piping runs, valve locations and identification, pump locations and identification, and equipment location. For buried construction, include tie dimensions.

C. Electrical Construction:

1. Incorporate large conduit runs, switchgear and panel locations, equipment locations, and controls locations. For buried construction, include tie dimensions.

D. Plumbing Construction:

1. Incorporate above ground and underground piping runs, clean-outs, and valve locations and identification. For buried construction, include tie dimensions.

1.03 SITE WORK

A. Parking Lot, Pavement, Fields and General Site Construction:

1. Provide a survey, signed and sealed by NYS licensed Land Surveyor. Mark-ups of the Construction Documents will not be accepted unless agreed to in advance by the Architect for small-scope projects only.

a. If a land survey of existing conditions is provided in the Construction Documents, the contractor shall update that land survey as the basis of the as-built, utilizing the surveyor that performed said original survey.

2. Incorporate layout changes, drainage structure locations, piping locations, invert elevations, fences, and topography.

a. If site work is relevant to a new building or building addition, provide actual finish floor elevations at all doorways, and actual building perimeter locations and dimensions.

B. Utility Service Construction:

1. Provide a survey, signed and sealed by NYS licensed Land Surveyor. Mark-ups of the Construction Documents will not be accepted unless agreed to in advance by the Architect for small-scope projects only.

a. If a land survey of existing conditions is provided in the Construction Documents, the contractor shall update that land survey as the basis of the as-built, utilizing the surveyor that performed said original survey.

2. Incorporate layout changes, electrical primaries and secondaries, transformers, water services, gas services, sewer lines, and sanitary systems with leaching structure locations, piping locations, and invert elevations.

a. Include tie dimensions to visible above ground elements for buried construction.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 024119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provision of Contract, including General and Supplementary Conditions and Division 01 - Specification Sections, apply to work of this Section.

B. The work must comply with the requirements of the following related specifications sections when applicable:

1. Section 013500 – Commissioner's Regulations
2. Section 013563 – LEED Requirements (For LEED Certified Projects)
3. Section 017419 – Construction Waste Management (For LEED Certified Projects)

1.02 SUMMARY

A. Section Includes:
1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Extent of selective demolition work is indicated on drawings and/or specified herein.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition shall remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.05 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.06 INFORMATIONAL SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review and approval prior to commencement of work.

B. See Section 013563 for additional submittal requirements for LEED Projects.

C. Qualification Data: For refrigerant recovery technician.

D. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

E. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

F. Inventory: Submit a list of items that have been removed and salvaged.

G. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that may be damaged during demolition.

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

I. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.08 JOB CONDITIONS

A. Owner will be occupying areas of the building immediately adjacent to areas of selective demolition. Demolition work must be conducted in a manner to minimize disruption of normal Owner’s operations.

B. Exits: All exits must be kept clear and maintained.

C. Protection: Provide temporary barricades and other forms of protection as required to protect Owner's personnel, staff and General Public from injury due to selective demolition work and new construction.

1. Prevent dust and dirt from rising and entering the building.
2. Protect adjacent floor areas with suitable coverings.

D. All work in an Educational Facility must comply with the Commissioners Regulations and Uniform Safety Standards for School Construction and Maintenance Projects. Reference Section 013500 for additional information.

E. Project Waste: All project waste and rubbish to be disposed in containers provided by the Contractor for subsequent legal off site disposal in accordance with Specifications Sections 013563 and 017419. Container locations to be coordinated with the Owner. Off site disposal must be on a regular basis.

F. Damage: Promptly repair or replace areas that are to remain and are damaged by demolition or removal work.

G. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

H. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

I. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in Division 00 – Front End Documents of the Project Manual. Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

J. Storage or sale of removed items or materials on-site is not permitted.

K. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.
2. Contractor shall provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities be required to be shut down during construction work.
3. Do not disable or disrupt building fire or life safety systems without (1) one week prior written notice to Architect or Construction Manager.

1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials utilizing approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Notify warrantor on completion of demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project Closeout.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Examine the areas and conditions under which work of this Section will be performed for any interferences, or conditions which will be detrimental to timely and proper completion of the work.

C. Report any interferences or unsatisfactory conditions to the Architect in writing. Do not proceed until interferences or unsatisfactory conditions have been removed or corrected.

D. Review Project Record Documents of existing construction or existing conditions and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in the Project Record Documents.

E. Survey existing conditions and reference scope of work on Drawings to determine extent of selective demolition required.

F. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

G. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and/or video.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies. Provide 1 week notice to the Architect prior to any utility shut-downs.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary

services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect and make operational.
    e. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    f. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.03 PROTECTION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

    1. Comply with requirements for access and protection specified in Section 015000 – Temporary Facilities and Controls.

B. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

    1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building. Maintain existing minimum required widths of egress pathways throughout.
    2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
    3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations. Erect and maintain dust-proof closures to prevent the spread of dust to adjacent areas.
    4. Cover and protect furniture, furnishings, and equipment that have not been removed.
    5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 – Temporary Facilities and Controls

C. Temporary Shoring: Design, provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished. Provide engineered signed and sealed drawings prepared by a Professional Engineer.
    1. Strengthen or add new supports when required during progress of selective demolition.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

    1. Proceed with selective demolition systematically, from higher to lower level. Complete selective

demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner or as indicated on Drawings.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or create items after cleaning and repairing. Identify content of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (25 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use

methods requiring solvent-based adhesive strippers.

E. Roofing: Remove no more existing roofing than what can be covered in once day by new roofing and so that building interior remains watertight and weathertight. Refer to Roofing Specifications.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Each day, remove debris, rubbish, and other materials resulting from demolition operations from building in accordance with Specifications Sections 013563 and 017419. Material to be disposed in containers provided by the Contractor. *(For LEED Certified Projects)*

B. Burning: Do not burn demolished materials.

3.07 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began. Upon completion of demolition work, remove tools, equipment and all remaining demolished materials from site. Leave areas broom clean.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 028000 – ASBESTOS WORK UNDER THIS CONTRACT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The abatement (removal, encapsulation, enclosure, repair or handling) of asbestos material in any quantity shall be performed by a New York State Department of Labor (NYSDOL) licensed abatement contractor in strict accordance with all federal, state, and local regulations including, but not limited to:

1. EPA 40 CFR 61 Subpart M National Emissions Standards for Hazardous Air Pollutants (NESHAP)
2. EPA 40 CFR Part 763 Asbestos Hazard Emergency Response Act (AHERA)
3. OSHA 29 CFR 1910 Occupational Safety and Health Standards
4. OSHA 29 CFR 1926 Safety and Health Regulations for Construction
5. NYSDOL 12 NYCRR Part 56 Industrial Code Rule 56 (ICR56)
6. NYSDEC 6 NYCRR Part 360 Solid Waste Management Facilities
7. NYSEC 6 NYCRR Part 364 Waste Transporters
8. NYSDOH NYCRR Part 73 Asbestos Safety Program Requirements

Any modifications must be approved by the NYSDOL in the form of a site-specific variance. Use of any variances must also be reviewed and approved for use by the Owner and/or their designated representatives.

In the event of any conflict or inconsistency between any of these regulations, including any site-specific variances, the most stringent rule/procedures shall apply.

B. The contractor is responsible to provide all labor, materials, and equipment, including electrical and water utilities to the work areas. All fees and or fines associated with required permits, agency notifications, etc. are also the responsibility of the contractor.

C. The contractor shall provide copies of all permits, agency notifications, licenses, building postings, and proposed abatement schedule to the owner/owner's representative at least ten (10) business days prior to mobilization.

D. In accordance with NYSICR 56, the contractor shall maintain an Asbestos Abatement Contractor Daily Project Log. This log must be available onsite for the duration of the project for on-demand review by the owner/owner's representative. A copy of this log shall be submitted to the owner along with other required closeout submittals.

E. The owner shall retain the services of an independent 3rd party air monitoring firm to collect required sampling in accordance with NYSICR 56 and AHERA, as applicable. The contractor is required to ensure cooperation of its personnel and shall abide by the findings of the Visual Inspection by the Project Monitor Prior to Clearance Air Sampling as well as unsatisfactory air sample results. Any costs associated with the repeated inspections, labor, and sampling due to failure to properly clean the work areas will be back charged to the contractor.

F. Upon mobilization to the project site, the contractor shall be responsible for the entire work area including site safety and security.

G. Should visible emissions or water leaks be observed outside the Work Area, immediately stop Work and institute emergency procedures per Code Rule 56. Should there be elevated fiber levels

outside the Work Area, immediately stop Work, institute procedures as per Code Rule 56. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

H. Locations of decontamination units, equipment storage, waste containers, NFU exhaust sites, and other staging areas shall be discussed with and approved by the owner/owner's representative. Relocation of any of these items for any reason shall be completed by the contractor upon notification.

I. The contractor shall provide copies of Safety Data Sheets (SDS) for all products to be applied during the project including but not limited to (surfactants, spray adhesives, encapsulants, mastic removers).

J. Project Close-out Submittals: Within 30 days of the completion of each abatement phase, the Contractor shall submit 4 copies of the documents listed below, for review and approval by the owner/owner's representative prior to final payment:

1. All waste disposal manifests and disposal logs.
2. OSHA compliance air monitoring records conducted during the Work.
3. Daily progress log, including the entry/exit log.
4. Provide statement that lists all Workers used in the performance of the Project, including name and NYS DOL certification number. The Statement shall be notarized.
5. Disposal Site/Landfill Permit from applicable regulatory agency.
6. Project notifications, amended notifications, Variances.

1.02 SCOPE OF WORK

A. The contractor shall reference the approved project drawings for all required asbestos abatement.

B. All costs associated with the improper/accidental disturbance/handling of asbestos containing materials shall be back charged to the contractor.

C. Working hours shall be as required and approved by the Owner. Asbestos abatement activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

D. The timing/phasing of individual work areas shall be communicated with the owner/owner's representative. The contractor shall provide cooperation to ensure efficient turnover of cleared work areas to the other trades and or the owner.

E. All ACM locations are descriptive and/or diagrammatic. All measurements and quantities are approximate. Exact locations and quantities should be field verified by the Contractor.

F. The contractor shall be responsible for the abatement of all specified materials. Any costs associated with re-mobilization due to failure to complete the scope of work shall be back charged to the contractor.

G. The contractor shall reference the following asbestos pre-construction report contained for details pertaining to asbestos testing results. If there is any confusion, or the contractor encounters materials not specifically identified in the pre-construction report, the contractor shall stop work until the materials can be evaluated by the owner/owner's representative.

H. Special Variances:

1. If the Contractor wishes to use any variances from NYS ICR 56 (applicable or otherwise) it must first be approved by the Owner or Owner's Agent. If the use of such variance is approved and requires additional air monitoring other than what is noted in section 17 of NYS ICR 56, then the Contractor shall be responsible for reimbursement of extra air monitoring costs to the Owner. The Contractor shall also be responsible for supplying the air monitoring firm with additional materials and equipment required to satisfy the variance requirements.

2. If the Contractor applies for the variance from the NYS DOL and it is not approved in a timely fashion adequate to complete the work within the designated time period, the Contractor must complete the scope of work without the variance at no additional cost to the District.

I. Restoration:

1. The Contractor is responsible for the cleaning and removal of all debris located in the work area and surrounding areas after the abatement has been completed. Any damages caused during the performance of abatement activities shall be repaired by the Contractor (ex. paint peeled off by barrier tape, nail holes, water damage, broken glass) at no additional expense to the building Owner.

2. The Contractor is responsible for restoring abatement surfaces to conditions acceptable to the building Owner, and Owner's representative. This shall include, but is not limited to lingering odors, or out gassing, from chemical methods of abatement, damage to substrates (ex. flooring, roof decking, etc.) caused by abatement techniques, and any other surface or subsurface damage caused by the abatement technique. The Contractor is responsible for the cleaning and removal of all debris located in the work area, and surrounding areas, after the abatement has been completed.

3. If any method of abatement results in any lingering odors, or other unexpected conditions the Contractor will be required to remediate such to pre-abatement conditions. The determination of the pre-abatement conditions will be made by the Owner, or Owner's Agent, unless otherwise documented by all parties prior to abatement activities being performed.

END OF SECTION

AT: THE WAVERLY SCHOOL
45 HALL AVE
EASTCHESTER, NY 10709

OWNER: EASTCHESTER UNION FREE SCHOOL DISTRICT
580 WHITE PLAINS RD
EASTCHESTER, NY 10709

CONSULTANT: QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.
(QUES&T)
1376 ROUTE 9
WAPPINGERS FALLS, NEW YORK 12590
PH. (845) 298-6031
FX. (845) 298-6251



BID SPECIFICATION DATED: October 5, 2026

PART I – GENERAL

1.01 DESCRIPTION

A. All work under this contract shall be performed in strict accordance with the specifications and all applicable laws for asbestos removal projects. The Abatement Contractor shall furnish all labor, materials, supervision, services, insurance, and equipment necessary for the complete and total removal of Asbestos-containing Materials (ACM) as described herein, in attachments to the specification, Job Specific Variance(s) and/or as directed by Eastchester UFSD (here-in-after the "Owner") and/or the Owners Representative(s) to support the to the following Eastchester UFSD projects:

EASTCHESTER UNION FREE SCHOOL DISTRICT
580 WHITE PLAINS RD
EASTCHESTER, NY 10709
SED NO. 66-03-01-03-0-002-012

B. Abatement Contractor shall provide for personnel air monitoring to satisfy OSHA regulation 29 CFR Parts 1926.1101(f). All work performed shall be in strict accordance with applicable provisions and regulations promulgated under New York State Department of Labor, Industrial Code 56 (ICR-56)

C. The Abatement Contractor shall satisfy the requirements for asbestos projects issued by the New York State Department of Labor concerning licensing and certification; notification; equipment; removal and disposal procedures; engineering controls; work area preparation; decontamination and clean-up procedures; and personnel air monitoring.

D. The Abatement Contractor shall be responsible for submittal of asbestos project notification(s) and applicable fees to EPA and NYSDOL concerning this project. Project notification(s) shall be made for the cumulative total of ACM to be removed as required by ICR-56-3.4. Work practices for each individual work area established shall be consistent with the quantity of ACM contained within that work area as defined in ICR-56-2.

E. The scope of work under this contract shall include the following:

1. All asbestos-containing materials (ACM) shall be removed in accordance with these specifications. The Abatement Contractor is responsible for field verification of estimated quantities, locations and other site conditions that may affect work.

2. All fixed objects remaining within the work area(s) shall be protected as required by Title 12 NYCRR Section 56-7.10(b) and as described in these specifications.

3. The containerization, labeling and disposal of all asbestos waste in accordance with applicable city, state and federal regulations and these specifications.

4. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to, ceiling tiles, ceiling finishes, wall finishes and/or floor finishes, etc.

5. The Abatement Contractor shall be responsible for any and all demolition required to access materials identified in scope of work and on associated drawings.

6. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner(s) immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. If the Abatement Contractor removes additional asbestos prior to the order to proceed the additional work will not be acknowledged.

7. Permissible working hours shall be Monday through Friday 7:00 A.M. to 4:00 P.M. with one (1) hour for lunch and/or as defined by the Owner. Holidays shall be considered weekends and not included for working days. Upon written approval from the Owner, the Abatement Contractor may work past these hours. The Abatement Contractor will incur any and all costs associated for work performed beyond the defined schedule including, but not limited to: abatement activities, project/air monitoring, custodial/staffing labor, overtime, mobilizations, etc.

8. Buildings will be turned over to the Abatement Contractor as is. At that time, all electrical services and HVAC systems in the proposed work areas will be shut down. Electricity and water supply will be maintained in the building for use by the Abatement Contractor. The Abatement Contractor is responsible for securing all power in the work area(s) and establishing all temporary GFCI hookups necessary to complete his work.

9. The Abatement Contractor shall remove identified asbestos-containing floor coverings to the building substrate beneath; in areas indicted. After final air clearances, the substrate(s) shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.

10. The Abatement Contractor must coordinate location of waste containers with the Facility and the Owner. Deliveries and storage of equipment must be coordinated with the Facility and the Owner.

11. All “Large” and “Small” asbestos abatement projects, as defined by 12 NYCRR56 shall not be performed while the building is occupied. The term “building” means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exists that do not pass through the occupied portion(s) and ventilation systems must be physically separated and sealed at the isolation barriers.

1.02 PRE-CONTRACT SUBMITTALS

Within three (3) days after bids are opened, the three (3) apparent low bidders shall be required to submit the following documentation:

A. Resumes: Shall include the following:

1. Provide a list of projects of similar nature performed within the past two (2) years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number, include location of project and date of completion.

2. Abatement Contractor license issued by New York State Department of Labor for asbestos work in accordance with ICR-56-3.

3. A list of owned equipment available to be used in the performance of the project.

4. The number of years engaged in asbestos removal.

5. An outline of the worker training courses, and medical surveillance program conducted by the Abatement Contractor.

6. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.

7. Documentation to the satisfaction of the Owner pertaining to the Abatement Contractor's financial resources available to perform the project. Such data shall include, but not be limited to, the firm's balance sheet for the last fiscal year.

B. Citations/Violations/Legal Proceedings

1. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous asbestos abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.

2. Answer the question: "Has your firm or its agents been issued a Stop Work order on any project within the last two years?" If "Yes" provide details as discussed above.

3. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitrations arising out of your performance on Asbestos Abatement Contracts?" If "Yes" provide details as discussed in 1. above.

4. Describe any liquidated damages assessed within the last two years.

C. Preliminary Schedule

1. Provide a detailed schedule including work dates, work shift times, estimate of manpower to be utilized and the start and completion date for completion of each major work area.

1.03 DOCUMENTATION

A. The Abatement Contractor shall be required to submit the following and receive the Consultant's approval prior to commencing work on this project:

1. Provide documentation of worker training for each person assigned to the project. Documentation shall include copies of each workers valid New York State asbestos handler certificates (for those employees who may perform asbestos removal), documentation of current respirator fit test and current OSHA required training and medical examination.

2. The attached "Asbestos Employee Medical Examination Statement" and "Asbestos Employee Training Statement" forms shall be completed, signed and submitted for each worker assigned to the project. Records of all employee training and medical surveillance shall be maintained for at least forty (40) years. Copies of the records shall be submitted to the Consultant prior to commencement.

3. The Abatement Contractor shall submit proof of a current, valid license issued by the New York State Department of Labor pursuant to the authority vested in the Commissioner by section 906 of the Labor Laws, and that the employees performing asbestos related work on this project are certified by the State of New York as required in Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York latest edition. Copies of all licenses shall be submitted prior to the commencement of the project.

4. The Abatement Contractor shall submit a written respiratory protection program meeting the requirements of 29 CFR 1910.134 to the Consultant.

5. The name, address, social security number and NYS DOL certificate number of the person(s) who will supervise the asbestos project.

6. The name and address of the deposit or waste disposal site or sites where the asbestos materials are to be deposited or disposed of. This site must be approved by the Owner. The manifesting procedure must also be specified.

7. The name, address and New York State Dept. of Environmental Conservation ID Number of any transporters that are to be used to transport waste.

8. A written Standard Operation Procedure (SOP) that is designed and implemented to maximize protection against human exposure to asbestos dust. The SOP shall take into consideration the workers, visitors, building employees, general public and environment. As a minimum the procedures must include the following:

   a. Security for all work areas on an around-the-clock basis against unauthorized access.

   b. Project organization chart including the phone numbers of at least two responsible persons who shall be authorized to dispatch men and equipment to the project in the event of an emergency: including weekends.

   c. Description of protective clothing and NIOSH approved respirators to be used.

   d. Description of all removal methods to be used, including HEPA air filtration and decontamination sequence with special emphasis on any procedure that may deviate from these specifications.

e. A list of manufacturers' certificates stating that all vacuums, negative air filtration equipment, respirators and air supply equipment meet OSHA and EPA requirements.

f. A list of all materials proposed to be furnished and used under this contract.

g. Emergency evacuation procedures in the event of fire, smoke or accidents such as injury from falling, heat exposure, electrical shock, etc.

h. The name, address and ELAP number of the New York State Department of Health Certified Analytical Testing Laboratory the Contractor proposes to use for the OSHA monitoring.

9. A detailed plan, in triplicate, for the phasing of the project, division of work areas and location of decontamination facilities, waste containers and temporary office.

10. Work schedule, identifying firm dates and completion for actual areas. Bar chart or critical path chart indicating phases is required.

B. The Abatement Contractor shall post their NYS DOL contractor's license and maintain a daily log documenting the dates and time of the following items within each personal decontamination unit:

1. Meetings; purpose, attendants, discussion (brief)

2. Sign-in and sign-out of all persons entering the work area including name, date, time, social security number, position or function and general description of daily activity.

3. Testing of barriers and enclosure systems using smoke tubes prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

4. Inspection of all plastic barriers, twice daily, by the asbestos supervisor.

5. Loss of enclosure integrity; special or unusual events, barrier breaches, equipment failures, etc.

6. Daily cleaning of enclosures.

7. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

C. Documentation with confirmation signature of Consultant's representative of the following shall be provided by the Abatement Contractor at the final closeout of the project.

1. Testing of barriers and enclosure systems using smoke tubes shall be performed prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

2. Inspection of all plastic barriers.

3. Removal of all polyethylene barriers.

4. Consultant's inspections prior to encapsulation.

5. Removal of waste materials.

6. Decontamination of equipment (list items).

7. Consultant's final inspection/final air tests.

D. The Abatement Contractor shall provide records of all project information, to include the following which shall be submitted upon completion of the project and prior to approval of the Abatement Contractor's payment application:

1. The location and description of the abatement project.

2. The name, address and social security number of the person(s) who supervised the asbestos project.

3. Certified payroll documentation Pursuant to Article 8, Section 220 of the NYS Labor Law

4. Copies of EPA/NYSDOL Asbestos Certificates for all Workers and Supervisors employed on the Project.

5. Copies of Medical Approval and Respirator Fit-testing for all Asbestos Workers and Supervisors employed on the Project.

6. Copies of Abatement Contractors Daily Sign-In Sheets & Logs for persons entering and leaving the work area. – Title 12 NYCRR Part 56-7.3.

7. Copies of Abatement Contractor's personal air sampling laboratory results.

8. The amounts and type of asbestos materials that was removed, enclosed, encapsulated, or disturbed.

9. The name and address of the deposit or waste disposal site or sites where the asbestos waste materials were deposited or disposed of and all related manifests, receipts and other documentation associated with the disposal of asbestos waste.

10. The name and address of any transporters used to transport waste and all related manifests, receipts and other documentation associated with the transport of asbestos waste.

11. All other information that may be required by state, federal or local regulations.

12. Copy of the Supervisor's Daily Project Log of events as described in 1.03 B, above.

1.04 NOTIFICATIONS AND PERMITS

A. The Abatement Contractor shall be required to prepare and submit notifications to the following agencies at least ten (10) days prior to the commencement of the project:

1. Asbestos NESHAPS Contact
   U.S. Environmental Protection Agency
   NESHAPS Coordinator, Air Facilities Branch
   26 Federal Plaza
   New York, New York 10007
   (212) 264-7307

2. State of New York Department of Labor
   Division of Safety and Health
   Asbestos Control Bureau
   State Office Building Campus, Building 12, Room 454
   Albany, New York 12240

3. Owner(s): Eastchester Union Free School District
   580 White Plains Rd
   Eastchester, Ny 10709
   Attn. Elliot Sheldon
   Director Of Facilities & Operations
   ESHELDON@EUFSDK12.ORG

4. Owner's Representative(s): BBS Architecture
   244 East Main Street
   Patchogue, NY 1177210 Brown Road
   ATTN: John Prentice
   Ph. (631) 475-0349
   Fx. (631) 475-0361
   E-mail. PRENTICE@BBSARCH.COM

5. Environmental Consultant(s): Quality Environmental Solutions & Technologies, Inc. (QuES&T)
   1376 Route 9
   Wappingers Falls, New York 12590
   ATTN: Lawrence Holzapfel
   Ph. (845) 298-6031
   Fx. (845) 298-6251
   E-mail. LHOLZAPFEL@QUALITYENV.COM

B. The notification shall include but not be limited to the following information:

1. Name and address of Owner.

2. Name, address and asbestos handling license number of the Abatement Contractor.

3. Address and description of the building, including size, age, and prior use of the building or area; the amount, in square feet or linear feet of asbestos material to be removed; room designation numbers or other local information where asbestos material is found, including the type of asbestos material (friable or non-friable).

4. Scheduled starting and completion dates for removal.

5. Methods to be employed in abating asbestos containing materials.

6. Procedures and equipment, including ventilating/exhaust systems, that will be employed to comply with the Code of Federal Regulation (CFR) Title 40, Part 61 of the U.S. Environmental Protection Agency.

7. The name and address of the carting company and of the waste disposal site where the asbestos waste will be deposited.

NOTE: Notifications shall be submitted using standard forms as may be used by the respective agency.

For DOL (NYS) include "Asbestos Project Notification" form (DOSH-483) with proper fee, if required.
For EPA include "Notification of Demolition and Renovation"; 40 CFR Part 61.

C. The Abatement Contractor shall secure any permits required by the city, town, county, or state that may be required and the cost for obtaining the permit shall be included in his base bid.

D. The Abatement Contractor shall erect warning signs around the workspace at every point of potential entry into the regulated work area in accordance with in accordance with 29 CFR 1926.1101(k)(7). Signs shall be posted at such a distance that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. These signs shall at minimum bear the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORS PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

E. The Abatement Contractor shall post at entrances to the workplace and immediate adjacent areas, notifications to building occupants, which include the name and license number of the contractor, project location and size, amount and type of ACM, abatement procedures, dates of expected occurrence and name and address of the air monitor and laboratory in compliance with ICR 56-3.6.

F. The Abatement Contractor shall post a list of emergency telephone numbers at the job site which shall include the Owner's Representative, police, emergency squad, local hospital, Environmental Protection Agency, N.Y. State Department of Labor, Occupational Safety and Health Administration and the local Department of Health.

1.05 APPLICABLE STANDARDS

Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effects (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith. Resolution of overlapping and conflicting requirements, which result from the application of several different industry standards to the same unit of work, shall be by adherence to the most stringent requirement.

A. Applicable standards listed in these Specifications form a part of this Specification and include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. ANSI:
   American National Standards Institute
   1430 Broadway
   New York, New York 10018

2. ASHRAE:
   American Society for Heating, Refrigerating
   and Air Conditioning Engineers
   1791 Tullie Circle NE
   Atlanta, Georgia 30329

3. ASTM:
   American Society for Testing and Materials
   1916 Race Street
   Philadelphia, Pennsylvania 19103

4. CFR
   Code of Federal Regulations Available
   from Government Printing Office
   Washington, District of Columbia 20402

5. CGA
   Compressed Gas Association
   1235 Jefferson Davis Highway
   Arlington, Virginia 22202

6. CS
   Commercial Standard of NBS
   (US Dept. of Commerce)
   Government Printing Office

7. EPA

   Environmental Protection Agency, Region II
   26 Federal Plaza
   New York, New York 10007
   Asbestos Coordinator - Room 802
   (212) 264-9538
   Part 61, Sub-Parts A & B
   National Emission Standard for Asbestos

8. FEDERAL SPECS

   Federal Specification (General Services Administration)
   7th and D Street, SW
   Washington, District of Columbia 20406

9. NBS

   National Bureau of Standards
   (US Department of Commerce)
   Gaithersburg, Maryland 20234

10. NEC

    National Electrical Code (by NFPA)

11. NFPA

    National Fire Protection Association
    Batterymarch Park
    Quincy, Massachusetts 02269

12. NIOSH

    National Institute for Occupational Safety and Health
    26 Federal Plaza
    New York, New York 10007

13. NYSDOH

    New York State Department of Health
    Bureau of Toxic Substance Assessment
    Room 359 - 3rd Floor
    Tower Building Empire State Plaza
    Albany, New York 12237

14. NYSDEC

    New York State Department of Environmental Conservation
    Room 136
    50 Wolf Road
    Albany, New York 12233-3245

15. NYSDOL

    State of New York Department of Labor
    Division of Safety and Health
    Asbestos Control Program
    State Campus
    Building 12
    Albany, New York 12240

16. OSHA

    Occupational Safety and Health Administration
    (US Department of Labor)
    New York Regional Office - room 3445
    1515 Broadway
    New York, New York 10036

17. UL

    Underwriters Laboratories
    333 Pfingsten Road
    Northbrook, Illinois 60062

B. Federal Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA):

   a. Asbestos Regulations
      Title 29, Part 1910, of the Code of Federal Regulations.

   b. Respiratory Protection
      Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

   c. Construction Industry
      Title 29, Part 1926, of the Code of Federal Regulations.

   d. Access to Employee Exposure & Medical Records
      Title 29, Part 1910, Section 20 of the Code of Federal Regulations.

   e. Hazard Communication
      Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.

   f. Specifications for Accident Prevention Signs and Tags
      Title 29, Part 1910, section 145 of the Code of Federal Regulations.

2. U.S. Environmental Protection Agency (EPA):

   a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Subpart E of the Code of Federal Regulations.

   b. Worker Protection Rule
      40 CFR Part 763, Subpart G, CPTS 62044, FLR 2843-9
      Federal Register, Vol. 50, No. 134, 7/12/85, P28530-28540

   c. Regulation for Asbestos
      Title 40, Part 61, Subpart A of the Code of Federal Regulations

   d. National Emission Standard for Asbestos
      Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations

   e. Resource Conservation and Recovery Act (RCRA) 1976, 1980
      Hazardous and Solid Waste Amendments (HSWA) 1984
      Subtitle D, Subtitle C

3. U.S. Department of Transportation (DOT):

   a. Hazardous Substances: Final Rule Regulation 49 CFR, Part 171 and 172.

C. State Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. New York State Department of Environmental Conservation (DEC) Regulations regarding waste collection registration. Title 6, Part 364 of the New York State Official Compilation of Codes, Rules and Regulations - 6NYCRR 364.

2. New York State Right-To-Know Law

3. New York State Department of Labor Asbestos Regulations Industrial Code Rule 56.

4. New York State Department of Health – Title 10, Part 73

D. Standards: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. American National Standards Institute (ANSI)

   a. Fundamentals Governing the Design and Operation of Local Exhaust Systems
      Publication Z9.2-79

   b. Practices for Respiratory Protection
      Publication Z88.2-80

E. Guidance Documents: Those that discuss asbestos abatement work or hauling and disposal of asbestos waste materials are listed below only for the Abatement Contractor's information. These documents do not describe the work and are not a part of the work of this contract.

EPA:

1. Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
   EPA560/5-85-024.

2. Asbestos Waste Management Guidance EPA 530-SW-85-007.

F. Patents and Royalties: The Abatement Contractor shall pay all royalties and/or license fees. The Abatement Contractor shall defend all suits and claims for infringement of any patent rights and save the Owner and Consultant harmless from loss including attorney fees on account thereof.

1.06 DEFINITIONS

As used in or in connection with these specifications the following are terms and definitions.

Abatement - Procedure to control release from asbestos material. This includes removal, encapsulation and enclosure.

Aggressive sampling - A method of sampling in which the person collecting the air sample creates activity using mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

AIHA - The American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

Airlock - A system for permitting entrance and exit while restricting air movement between a containment area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

Air sampling - The process of measuring the content of a known volume of air collected during a specific period of time.

Amended water - Water to which a surfactant has been added.

Approved asbestos safety program - A program approved by the Commissioner of Health providing training in the various disciplines that may be involved in an asbestos project.

Area air sampling - Any form of air sampling or monitoring where the sampling device is placed at some stationary location.

Asbestos - Any naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cummingtonite - gunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

Asbestos contract - An oral or written agreement contained in one or more documents for the performance of work on an asbestos project and includes all labor, goods and service.

Asbestos handler - An individual who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material, or who disturbs friable asbestos. Only individuals certified by NYS Department of Labor shall be acceptable for work under this specification.

Asbestos handling certificate - A certificate issued by the Commissioner of Labor of the State of New York, to a person who has satisfactorily completed an approved asbestos safety program.

Asbestos project - Work undertaken by a contractor which involves the installation, removal, encapsulation, application or enclosure of any ACM or the disturbance of friable ACM.

Asbestos Safety Technician (AST) - Individual designated to represent the Consultant, perform third party monitoring and perform compliance monitoring at the job site during the asbestos project.

Asbestos waste material - Asbestos material or asbestos contaminated objects requiring disposal.

Authorized visitor - The building owner, his or her representative or any representative of a regulatory or other agency having jurisdiction over the project.

Background level monitoring - A method used to determine ambient airborne concentrations inside and outside of a building or structure prior to starting an abatement project.

Building owner - The person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

Clean room - An uncontaminated area or room that is a part of the personal decontamination enclosure with provisions for storage of persons' street clothes and protective equipment.

Cleanup - The utilization of HEPA vacuuming to control and eliminate accumulations of asbestos material and asbestos waste material.

Clearance air monitoring - The employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement project.

Commissioner - Commissioner of the New York State Department of Labor.

Contractor - A company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

Curtained doorway - A device that consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and the left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

Decontamination enclosure system - A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of persons, materials, equipment, and authorized visitors.

Encapsulant (sealant) or encapsulating agent - A liquid material that can be applied to asbestos material and which prevents the release of asbestos from the material by creating a membrane over the surface.

Enclosure - The construction of airtight walls, ceilings and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, or any other appropriate procedure that prevents the release of asbestos materials.

Equipment room - A contaminated area or room that is part of the personal decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

Fixed object - A unit of equipment, furniture or other fixture in the work area which cannot be readily removed from the work area.

Friable Asbestos Material - That condition of crumbled, pulverized, powdered, crushed, or exposed asbestos capable of being released into the air by hand pressure.

Friable material containment - The encapsulation or enclosure of any friable asbestos material.

Glovebag technique - A method for removing asbestos material from heating, ventilating, and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other nonplanar surfaces in a non-contained work area. The glovebag assembly is a manufactured device consisting of a glovebag constructed of at least six mil transparent plastic, two inwards-projecting long sleeve gloves, which may contain an inward projecting water wand sleeve, an internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and to contain all asbestos fibers released during the abatement process.

HEPA filter - A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particulate greater than 0.3 microns equivalent aerodynamic diameter.

HEPA vacuum equipment - Vacuuming equipment with a high efficiency particulate air filtration system.

Holding area - A chamber in the waste decontamination enclosure located between the washroom and an adjacent uncontaminated area.

Homogeneous work area - A site within the abatement work area that contains one type of asbestos material and where one type of abatement is used.

Large asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material.

Minor asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material.

Movable object - A unit of equipment, furniture or fixture in the work area that can be readily removed from the work area.

Negative air pressure equipment - A local exhaust system equipped with HEPA filtration. The system shall be capable of creating and maintaining a negative pressure differential between the outside and the inside of the work area.

Non-asbestos material - Any material containing one percent or less asbestos by weight.

Occupied area - Any frequented portion of the work site where abatement is not taking place.

Outside air - The air outside the building or structure.

Personal air monitoring - A method used to determine an individual's exposure to airborne contaminants. The sample is collected outside the respirator in the person's breathing zone.

Plasticize - To cover floors, walls, ceilings, and other surfaces with 6 mil fire retardant plastic sheeting as herein specified.

Project - Any form of work performed in connection with the abatement of asbestos or alteration, renovation, modification or demolition of a building or structure that may disturb asbestos or asbestos material.

Removal - The stripping of any asbestos material.

Repair - Corrective action using required work practices to control fiber release from damaged areas.

Respiratory protection - Respiratory protection required of licensed asbestos workers and authorized visitors in accordance with the applicable laws.

Satisfactory clearance air monitoring results - For all post- abatement samples, airborne concentrations of total fibers that are less than 0.01 fibers per cubic centimeter or background levels, whichever are greater, using phase contrast microscopy (PCM).

Shower room - A room between the clean room and the equipment room in the personal decontamination enclosure with hot and cold running water controllable at the top and arranged for complete showering during decontamination.

Small asbestos project - An asbestos project involving the installation, removal, disturbances, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material of more than 25 and less than 260 linear feet of asbestos or asbestos material.

Staging area - The area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

Surfactant - A chemical wetting agent added to water to improve its penetration.

Visible emissions - An emission of particulate material that can be seen without the aid of instruments.

Washroom - A room between the work area and the holding area in the waste decontamination enclosure system, where equipment and waste containers are wet cleaned and/or HEPA vacuumed.

Waste decontamination enclosure system - An area, consisting of a washroom and a holding area, designated for the controlled transfer of materials and equipment.

Wet cleaning - The process of eliminating asbestos contamination from surfaces, equipment or other objects by using cloths, mops, or other cleaning tools.

Work area - Designated rooms, spaces, or areas where asbestos abatement takes place.

Work site - Premises where asbestos abatement is taking place.

Work Surface - Substrate surface from which asbestos-containing material has been removed.

1.07 UTILITIES, SERVICE AND TEMPORARY FACILITIES

A. The Owner shall make available to the Abatement Contractor all reasonable amounts of water and electrical power at no charge.

B. The Abatement Contractor shall provide, at his own expense, all electrical, water, and waste connections, extensions, and construction materials, supplies, etc. All connections must be approved in advance by the Owner and all work relative to the utilities must be in accordance with the applicable building codes.

C. The Abatement Contractor shall provide scaffolding, ladders and staging, etc. as necessary to accomplish the work of this contract. The type, erection and use of all scaffolding, ladders and staging, etc. shall comply with all applicable OSHA provisions.

D. All connections to the Owner's water system shall include reduced pressure backflow protection or double check and double gate valves. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.

E. The Abatement Contractor shall use only heavy-duty abrasion resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each decontamination unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. All water must be shut off at the end of each shift.

F. The Abatement Contractor shall provide service to decontamination unit electrical subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect and ground-fault circuit interrupters (GFCI), reset button and pilot light, connected to the building's main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. This electrical subpanel shall be used for hot water heater, PAPR battery recharging and air sampling pumps.

G. The Abatement Contractor shall provide UL rated 40-gallon electric hot water heater to supply hot water for the decontamination unit shower. Activate from 30 amp circuit breaker on the electrical subpanel located within the decontamination unit. Provide with relief valve compatible with water heater operation, relief valve down to drip pan on floor with type L copper. Wiring of the hot water heater shall be in compliance with NEMA, NEC, and UL standards.

H. The Abatement Contractor shall provide identification warning signs at power outlets, which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 plugs into higher voltage outlets. Dry transformers shall be provided where required to provide voltages necessary for work operations. All outlets or power supplies shall be protected by ground fault circuit interrupter (GFCI) at the power source.

I. The Abatement Contractor shall use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.

J. The Abatement Contractor shall provide general service incandescent lamps of wattage indicated or required for adequate illumination; Protect lamps with guard cages or tempered glass enclosures; Provide exterior fixtures where fixtures are exposed to moisture.

K. The Abatement Contractor shall provide temporary heat or air conditioning as necessary to maintain comfortable working temperatures inside and immediately outside the work areas. Heating and A/C equipment shall have been tested and labeled by UL, FM or another recognized trade association related to the fuel being used. Fuel burning heaters shall not be used inside containment areas. The Contractor shall also provide a comfortable working environment for occupied areas that are impacted by the asbestos removal.

L. The Abatement Contractor shall comply with recommendations of the NFPA standard regarding the use and application of fire extinguishers. Locate fire extinguishers where they are most convenient and effective for their intended purpose but provide not less than one extinguisher in each work area, equipment room, clean room and outside the work area.

1.08 REMOVAL OF FIXTURES

A. In locations where the Abatement Contractor is directed to dispose of fixtures, he shall either decontaminate the fixtures and dispose of them as non-asbestos containing materials or he shall place them in an appropriate container and dispose of them as asbestos containing material.

B. In locations where the Abatement Contractor is directed to remove and reinstall fixtures, the fixtures shall be removed, decontaminated, labeled, protected with plastic and stored by the contractor in a location as directed by the Owner.

C. Upon completion of the asbestos removal and upon receiving satisfactory clearance air monitoring results, all items to be replaced shall be restored to their original location and reinstalled by the Abatement Contractor.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. GENERAL REQUIREMENTS

1. Materials shall be stored off the ground, away from wet or damp surfaces and under protective cover to prevent damage or contamination.

2. Damaged or deteriorating materials shall not be used and shall be removed from the premises.

3. Power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

4. The Abatement Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work surfaces can be easily and safely reached for inspection. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos. Scaffolds and ladders shall comply with all applicable codes.

B. PLASTIC BARRIERS (POLYETHYLENE)

1. In sizes and shapes to minimize the number of joints.

   a. Six mil. (.006") fire-retardant for vertical protection (walls, entrances and openings).
   b. Six mil. (.006") fire-retardant for horizontal protection (fixed equipment) and heating grilles.
   c. Six mil. (.006") reinforced fire-retardant for floors of decon units.

2. Provide two (2) layers over all roof, wall and ceiling openings. Floor penetrations shall be sealed with a rigid material prior to plasticizing to prevent tripping and fall hazards. All seams within a layer shall be separated by a minimum distance of six feet and sealed airtight. All seams between layers shall be staggered.

3. Barrier Attachment - Commercially available duct tape (fabric or paper) and spray-on adhesive. Duct tape shall be capable of sealing joints of adjacent sheets of plastic, facilitating attachment of plastic sheets to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions.

C. SIGNS

1. Danger signs shall be provided and shall conform to the requirements of 29 CFR 1910.1101(k)(7) and shall comply with the requirements of ANSI Z535.2 2011 and shall be a minimum of 14" x 20". These signs shall bear the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area the warning sign shall include the following as a minimum:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

D. DANGER LABELS & TAPE

1. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain at a minimum the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

2. A label shall be affixed to each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall at a minimum contain the following information:

RQ ASBESTOS
SOLID, NOS, ORM-E, NA 9-NA 2212-PG III
(ASBESTOS)

E. PROTECTIVE EQUIPMENT

1. Respiratory Requirements

a. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators are the minimum allowable respiratory protection permitted to be utilized during removal operations.

b. Where not in violation of NIOSH, OSHA, and any other regulatory requirements, the Abatement Contractor shall provide the following minimum respiratory protection to the maximum use concentrations indicated:

MSHA/NIOSH Approved Respiratory Protection	Maximum Use Concentration
Half-Mask Air Purifying with HEPA Filters	10x PEL
Full-Facepiece Air Purifying HEPA Filters and Quantitative Fit Test	10x PEL

Powered Air Purifying (PAPR), Loose fitting Helmet or Hood, HEPA Filter	25x PEL
Powered Air Purifying (PAPR), Full Facepiece, HEPA Filter	50x PEL
Supplied Air, Continuous Flow Loose fitting Helmet or Hood	25x PEL
Supplied Air, Continuous Flow Full Facepiece, HEPA Filter	50x PEL
Full Facepiece-Supplied Air Pressure Demand, HEPA Filter	100x PEL
Full Facepiece-Supplied Air Pressure Demand, with Aux. SCBA, Pressure Demand or Continuous Flow	>100x PEL

2. Disposable Clothing -"Tyvek" manufactured by Dupont or approved equal.

3. NIOSH approved safety goggles to protect eyes.

4. Polyethylene bags, 6 mil. (.006") thick (use double bags).

NOTE: Workers must always wear disposable coveralls and respirator masks while in the work area. Contaminated coveralls or equipment must be left in work area and not worn into other parts of the building.

F. TOOLS AND EQUIPMENT

1. Airless Sprayer - An airless sprayer, suitable for application of encapsulating material, shall be used.

2. Scaffolding - Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.

3. Transportation Equipment - Transportation equipment, as required, shall be suitable for loading, temporary storage, transport and unloading of contaminated waste without exposure to persons or property. Water tight, hard wall containers shall be provided to retain and dispose of any asbestos waste material with sharp-edged components that may tear plastic bags or sheeting. The containers shall be marked with danger labels.

4. Surfactant - Wetting Agents - "Asbestos-Wet" - Aquatrols Corp. of America or approved equal and shall be non-carcinogenic.

5. Portable (negative air pressure) asbestos filtration system - by Micro-Trap or approved equal.

6. Vacuum, HEPA type equal to "Nilfisk" #GA73, or "Pullman/Holt" #75 ASA.

7. Amended Water Sprayer - The water sprayer shall be an airless or other low-pressure sprayer for amended water application.

8. Other Tools and Equipment - The Abatement Contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, nylon brushes, sponges, rounded edge shovels, brooms, and carts.

PART 3 – EXECUTION

3.01 PRE-ABATEMENT WORK AREA PREPARATION

A. The work area shall be vacated by the occupants prior to work area preparation and not reoccupied until satisfactory clearance air monitoring results have been achieved.

B. Caution signs shall be posted at all locations and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted that permit a person to read the sign and take the necessary protective measures to avoid exposure.

C. Shut down and lock out electric power to all work areas. The Abatement Contractor shall provide temporary power and lighting and ensure safe installation of temporary power sources and equipment used where high humidity and/or water shall be sprayed in accordance with all applicable codes. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.

D. Isolate the work area HVAC system.

E. The personnel decontamination enclosure system shall be installed or constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material. The waste decontamination enclosure system shall be installed or constructed prior to commencement of abatement activities.

F. Movable objects within the work area shall be pre-cleaned using HEPA filtered vacuum equipment an/or wet cleaning and such objects shall be removed from the work area to an uncontaminated location. If disposed of as asbestos waste material, cleaning is not required.

G. Fixed objects and other items, which are to remain within the work area, shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Such objects shall be enclosed with two layers of at least six mil plastic sheeting and sealed with tape.

H. The work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited. Asbestos material shall not be disturbed during pre-cleaning.

I. Isolation barriers that seal off all openings, including windows, corridors, doorways, ducts, and any other penetrations of the work area, shall be constructed using two layers of at least six mil fire-retardant plastic sheeting sealed with tape. Also, all seams in mechanical system components that pass through the work area shall be sealed. Doorways and corridors, which shall not be used for passage during work, shall also be sealed.

J. Removal of mounted objects. After isolation barriers are in place, objects such as light fixtures, electrical track, alarm systems, ventilation equipment and other items not previously sealed, shall be double sealed with six mil fire-retardant plastic sheeting. Localized HEPA filtered vacuum equipment shall be used during fixture removal to reduce asbestos dispersal.

K. Individual roof and floor drains shall be sealed watertight using two layers of 6-mil fire-retardant plastic sheeting and tape prior to plasticizing. Openings in floor shall be fully covered with plywood sheeting secured to the floor in such a way as to minimize a tripping hazard prior to plasticizing.

L. Emergency and fire exit from the work area shall be maintained or alternate exits shall be established according to all applicable codes.

M. Adequate toilet facilities shall be supplied by the Abatement Contractor and shall be located either in the clean area of the personnel decontamination enclosure or shall be readily accessible to the personnel decontamination enclosure.

3.02 LARGE ASBESTOS PROJECT PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. The personnel decontamination enclosure shall be constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material.

1. Construction and use of personnel decontamination enclosure systems shall be in accordance with ICR-56 and any Applicable or Site-Specific Variances utilized on this project. Such systems may consist of existing rooms outside of the work area, if the layout is appropriate, that can be enclosed is plastic sheeting and are accessible from the work area. When this situation does not exist, enclosure systems may be constructed out of metal, wood or plastic support.

2. The personnel decontamination enclosure system shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by three airlocks.

3. There shall be one shower per six full shift abatement persons calculated based on the largest shift.

4. The personnel decontamination enclosure system shall be fully framed, sheathed for safety and constructed to prevent unauthorized entry.

5. Personnel decontamination enclosure systems constructed at the work site shall utilize at least six mil fire-retardant opaque plastic sheeting. At least two layers of six mil fire-retardant reinforced plastic sheeting shall be used for the flooring of this area.

6. All prefabricated decontamination units shall be completely decontaminated and sealed prior to separation and removal from the work area. Mobile decontamination units shall remain in place until satisfactory clearance results have been attained.

7. The clean room shall be sized to accommodate all authorized persons. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall also be provided. Clean clothing, replacement filters for respirators, towels and other necessary items shall be provided. The clean room shall not be used for the storage of tools, equipment or materials. It shall not be used for office space. A lockable door shall be provided to permit access to the clean room from outside the work area or enclosure. It shall be used to secure the work area and decontamination enclosure during off-shift hours.

8. The shower room shall contain one or more showers. Each shower head shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be always available. Shower water shall be drained, collected and filtered through a system with at least 5.0-micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste. The shower room shall be constructed in such way that travel through the decontamination unit shall be through the shower.

9. The equipment room shall be used for the storage of equipment and tools after decontamination using a HEPA filtered vacuum and/or wet cleaning. A one-day supply of replacement filters, in sealed containers, for HEPA vacuums and negative pressure ventilation equipment, extra tools, containers of surfactant and other materials and equipment that may be required during the abatement project may also be stored here. A walk-off pan filled with water shall be in the work area just outside the equipment room for persons to clean foot covering when leaving the work area. A drum lined with a labeled, at least six mil plastic bag is required for collection of clothing and shall be in this room. Contaminated footwear and work clothes shall be stored in this area.

3.03 WASTE DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. General Requirements

1. A waste decontamination enclosure system shall consist of the following:

   a. A washroom/cleanup room shall be constructed with an airlock doorway to the work area and another airlock doorway to the holding area.

   b. The holding area shall be constructed with an airlock doorway to the washroom/cleanup room and another lockable door to the outside.

2. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the equipment decontamination room, which doubles as a waste washroom, of the personnel decontamination enclosure.

3. The waste washroom shall be equipped with a drain installed to collect water and deliver it to the shower drain where it shall be filtered through a system with at least 5.0-micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

4. The waste washroom shall be constructed in such a way that travel through the rooms shall be through the waste washroom

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved:

1. All persons shall enter and exit the work area through the personnel decontamination enclosure system.

2. All persons who enter the work area or an enclosure shall sign the entry/exit log, located in the clean room, upon every entry and exit.

3. All persons, before entering the work area, or an enclosure shall read and be familiar with all posted regulations, personal protection requirements, including work area entry and exit procedures, and emergency procedures. The entry/exit log headings shall indicate, and the signatures shall be used to acknowledge, that these have been reviewed and understood by all persons prior to entry.

4. All persons shall proceed first to the clean room, remove all street clothing, store these items in clean sealable plastic bags or lockers and don coveralls, head covering, foot covering and gloves. All persons shall also don NIOSH approved respiratory protection. Clean respirators and protective clothing shall be utilized, by each person, for each separate entry into the work area. Respirators shall be inspected prior to each use and tested for proper seal using quantitative or qualitative fit checks.

5. Persons wearing designated personal protective equipment shall proceed from the clean room through the shower room to the equipment room, where necessary tools are collected and any additional clothing shall be donned, before entry into the work area.

6. Before leaving the work area, all persons shall remove gross contamination from the outside of respirators and protective clothing by brushing, wet cleaning, and/or HEPA vacuuming.

7. Persons shall proceed to the equipment room where all coveralls, head covering, foot covering, and gloves shall be removed. Disposable clothing shall be deposited into labeled containers for disposal. Reusable contaminated clothing, footwear, head gear and gloves shall be stored in the equipment room when not being used in the work area.

8. Still wearing respirators, persons shall proceed to the shower area, clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then fully and vigorously shower and shampoo to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Some types of respirators will require slight modification of these procedures. An airline respirator with HEPA filtered disconnect protection shall be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece shall be disconnected from the filter/power pack assembly prior to entering the shower.

9. After showering and drying, all persons shall proceed to the clean room and don clean personal protective equipment if returning to the work area or street clothing if exiting the enclosure.

3.05 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION & REMOVAL PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved.

1. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. These work area persons shall not enter the airlock.

2. These contaminated items shall be removed from the airlock by persons stationed in the washroom during waste removal operations. These washroom persons shall remove gross contamination from the exterior of their respirators and protective clothing by brushing, HEPA vacuuming and/or wet cleaning.

3. Once in the waste decontamination enclosure system, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.

4. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting and sealed airtight.

5. The clean re-containerized items shall be moved into the airlock that leads to the holding area. The washroom persons shall not enter this airlock or the work area until waste removal is finished for that period.

6. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.

7. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

8. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

9. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

10. Containers labeled with Asbestos hazard warnings shall not be used to dispose of non-asbestos waste.

3.06 ENGINEERING CONTROLS

A. Ventilation.

1. The Abatement Contractor shall employ HEPA equipped vacuums or negative air pressure equipment for ventilation as required.

2. All negative air pressure equipment ventilation units shall be equipped with HEPA filtration. The Contractor shall provide a manufacturer's test certificate for each unit documenting the capability of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns equivalent aerodynamic diameter.

3. A power supply shall be available to satisfy the requirements of the total of all ventilating units.

4. On electric power failure, abatement shall stop immediately and shall not resume until power is restored and exhaust units are operating fully. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all persons from the work area, shall be sealed airtight.

5. If extending the exhaust of the ventilation units 50 feet from the building would result in an exhaust location either in the road, blocking driveway access to the facility or within 50 feet of other buildings, a second unit will be run in series with the primary unit.

3.07 MAINTENANCE OF DECONTAMINATION ENCLOSURE SYSTEMS AND WORK AREA BARRIERS

A. GENERAL REQUIREMENTS

1. The Consultant must review and approve installation before commencement of work. Upon completion of the construction of all plastic barriers and decontamination system enclosures and prior to beginning actual abatement activities.

2. All plastic barriers inside the work area, in the personnel decontamination enclosure system, in the waste decontamination enclosure system and at partitions constructed to isolate the work area from occupied areas, shall be inspected by the asbestos supervisor at least twice daily. The barriers shall be inspected before the start of and following the completion of the day's abatement activities. Inspections and observations shall be documented in the project log.

3. Damage and defects in the barriers and/or enclosure systems shall be repaired immediately upon discovery and prior to resumption of abatement activities.

4. At any time during the abatement activities, if visible emissions are observed outside of the work area of if damage occurs to the barriers, work shall be stopped, repairs made, and visible residue immediately cleaned up using HEPA vacuuming methods prior to the resumption of abatement activities.

5. The Abatement Contractor shall HEPA vacuum and/or wet clean the waste decontamination enclosure system and the personnel decontamination enclosure system at the end of each day of abatement activities.

3.08 HANDLING AND REMOVAL PROCEDURES

The Abatement Contractor may utilize existing provisions of ICR-56, Applicable Variances or a Site-Specific Variance, approved by the Owner's Consultant, to permit the conduct of this work.

3.09 ABATEMENT PROCEDURES

A. AIR SAMPLING - By Owner

1. Air sampling and analysis shall be conducted according to the requirements of Subpart 56-4 before the start, during and after the completion of the asbestos removal project.

2. In addition to the requirements of Subpart 56-4, air monitoring shall be conducted in accordance with any approved job specific variance(s) or applicable variance utilized.

3. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

4. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR 763.90[i].

B. The provisions of the Applicable Variances or a Job Specific Variance shall apply only in those areas where approval has been granted by the NYS DOL and the Contractor has obtained concurrence from the Owner's Consultant. All other applicable provisions of Industrial Code Rule 56-1 through 56-12 shall be complied.

C. A copy of the NYS DOL Job Specific or Applicable Variance, if applicable, shall be conspicuously posted at the work area(s).

D. The Abatement Contractor shall construct a decontamination unit at the work site. The Abatement Contractor shall, as a minimum, comply with the requirements of 29 CFR 1926.1101(j); Hygiene facilities and practices for employees.

3.10 ENCAPSULATION PROCEDURES

The following procedures shall be followed to seal in non-visible residue, after obtaining satisfactory clearance air monitoring results, while conducting lockdown encapsulation on any surfaces which were the subject of removal or other remediation activities:

A. Only encapsulants rated as acceptable or marginally acceptable based on Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA contract shall be used for lockdown encapsulation.

B. Sealants considered for use in encapsulation shall first be tested to ensure that the sealant is adequate for its intended use. A section of the work surface shall be evaluated following this initial test application of the sealant to quantitatively determine the sealant's effectiveness in terms of penetrating and locking down the asbestos fibers. The American Society of Testing and Materials (ASTM) Committee E06.21.06E on Encapsulation of Building Materials has developed a guidance document to assist in the selection of an encapsulant.

C. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

D. Encapsulants shall be applied using airless spray equipment.

1. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.

E. Encapsulation shall be utilized as a surface sealant once all asbestos containing materials have been removed in a work area. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring.

3.11 CLEANUP PROCEDURES

A. The following cleanup procedures shall be required.

1. Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos materials have been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.

2. Accumulations of dust shall be cleaned off all surfaces daily using HEPA vacuum cleaning methods.

3. Decontamination enclosures shall be HEPA vacuumed at the end of each shift.

4. Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.

5. Excessive water accumulation or flooding in the area shall require work to stop until the water is collected and disposed of properly.

B. The following cleanup procedures shall be required after completion of all removal activities.

1. All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pan, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.

2. Cleaning. All surfaces in the work area shall be HEPA vacuumed. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.

3. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.

4. All containerized waste shall be removed from the work area and the holding area.

5. All tools and equipment shall be decontaminated and removed from the work area.

6. A final visual inspection and clearance air monitoring, as per the schedule for air sampling and analysis, shall be conducted.

7. The isolation barriers and decontamination unit shall be removed only after satisfactory clearance air monitoring results have been achieved.

3.12 SAFETY MONITORING – CONSULTANT:

The Consultant will designate an Asbestos Safety Technician (AST) to represent the Owner during the removal program. The AST must be on the job site at all times during abatement work. Absolutely no abatement or preparation work will occur without the presence of the AST.

The AST will conduct four (4) milestone inspections.

1. Pre-commencement inspection shall be conducted as follows:

   a. Notification in writing to the Consultant shall be made by the Abatement Contractor to request a pre-commencement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested prior to beginning preparatory work in another work area.

   b. The AST shall ensure that:

      i. The job site is properly prepared and that all containment measures are in place.

      ii. The designated supervisor shall present to the inspector a valid supervisor's license issued by the New York Department of Labor.

      iii. All workers shall present to the inspector a valid handler's license issued by the New York Department of Labor.

      iv. Measures for the disposal of removed asbestos material are in place and shall conform to the adopted standards.

      v. The Abatement Contractor has a list of emergency telephone numbers at the job site which shall include the monitoring firm employed by the Owner and telephone numbers for fire, police, emergency squad, local hospital and health officer.

   c. If all is in order, the AST shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any work is to commence. Conditional approvals shall not be granted.

Progress inspection shall be conducted as follows:

a. Primary responsibility for ensuring that the abatement work progresses in accordance with these technical specifications and regulatory requirements rests with the Abatement Contractor. The AST shall continuously be present to observe the progress of work and perform required tests.

b. If the AST observes irregularities at any time, he shall direct such corrective action as may be necessary. If the Abatement Contractor fails to take the corrective action required, or if the Abatement Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, then the AST shall inform the Owner who shall issue a Stop Work Order to the Abatement Contractor and have the work site secured until all violations are abated.

Clean-up inspections shall be conducted as follows:

a. Notice for clean-up inspection shall be requested by the Abatement Contractor at least 24 hours in advance of the desired date of inspection.

b. The clean-up inspection shall be conducted prior to the removal of any isolation or critical barriers and before final air clearance monitoring.

c. The AST shall ensure that:

i. The work site has been properly cleaned and is free of visible asbestos containing material and debris.

ii. All removed asbestos has been properly placed in a locked secure container outside of the work area.

d. If all is in order, the AST shall issue a written notice of authorization to remove surface barriers from the work area. All isolation barriers shall remain in place until satisfactory clearance air sampling has been completed.

4. Clearance Visual Inspection shall be conducted after the removal of non-critical plastic sheeting. The AST shall insure that:

a. The work area is free of all visible asbestos or suspect asbestos debris and residue.

b. All waste has been properly bagged and removed from the work area.

c. Should clearance visual inspection identify residual debris, as determined by the AST, the Abatement Contractor is responsible for recleaning the area at his own cost and shall bear all costs of reinspection until acceptable levels are achieved.

B. The Abatement Contractor shall be required to receive written approval before proceeding after each milestone inspection.

3.13 PERSONNEL AIR MONITORING – CONTRACTOR (29 CFR 1926.1101)

A. Personnel air monitoring shall be provided to determine both short-term (STEL) and full shift during when abatement activities occur. Personnel sampling shall be performed in each work area to accurately determine the concentrations of airborne asbestos to which workers may be exposed.

B. The Abatement Contractor shall have a qualified "Competent Person" (as specified in 29 CFR 1926 OSHA) to conduct personnel air monitoring.

C. The laboratory performing the air sample analysis shall be certified by NYS DOH ELAP and approved by the consultant.

D. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

3.14 CLEARANCE AIR MONITORING

A. Air samples will be collected in and around the work areas at the completion of abatement activities.

B. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

C. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR part 763 “Asbestos-Containing Materials in Schools; Final Rule and Notice” section 763.90.

D. ***RETESTING***
Should clearance air monitoring yield fiber concentrations above the “Clearance” criteria of either 0.01 fibers per CC and/or background levels (PCM) –OR- seventy (70) structures per square millimeter (TEM/AHERA), the Abatement Contractor is responsible for re-cleaning the area at his own cost and shall bear all costs associated with the retesting of the work area(s) including monitoring labor, sampling, analysis, etc. until such levels are achieved.

3.15 RESPIRATORY PROTECTION REQUIREMENT

A. Respiratory protection shall be worn by all individuals inside the work area from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with these specifications. The Abatement Contractor shall always keep available two PAPR's with new filters and charged batteries for use by authorized visitors.

B. All respiratory protection shall be MSHA/NIOSH approved in accordance with the provisions of 30 CFR Part II. All respiratory protection shall be provided by the Abatement Contractor and used by workers in conjunction with the written respiratory protection program.

C. The Abatement Contractor shall provide respirators that meet the requirements of 29 CFR Parts 1910 and 1926.

1. Full facepiece Type C supplied-air respirators operated in pressure demand mode equipped with an auxiliary self-contained breathing apparatus, operated in pressure demand or continuous flow, shall be worn during gross removal, demolition, renovation and/or other disturbance of ACM whenever airborne fiber concentrations inside the work area are greater than 10.0 f/cc.

2. Full facepiece Type C supplied-air respirators operated in pressure demand mode with HEPA filter disconnect protection shall be work during gross removal, demolition, renovation and/or other disturbance of ACM with an amphibole content and/or whenever airborne fiber concentrations inside the work area are equal to or greater than 0.5 f/cc and less than or equal to 10.0 f/cc.

3. Full facepiece powered air-purifying respirators (PAPR) equipped with HEPA filters shall be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.5 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow, with HEPA filter disconnect protection, may be substituted for a powered air-purifying respirator.

4. Loose fitting helmets or hoods with powered air-purifying respirators (PAPR) equipped with HEPA filters may be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.25 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow may be substituted for a powered air- purifying respirator.

5. Half-mask or full-face air-purifying respirators with HEPA filters shall be worn only during the preparation of the work area and final clean up procedures provided airborne fiber concentrations inside the work area are less than 0.1 f/cc.

6. Use of single use dust respirators is prohibited for the above respiratory protection.

D. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.

E. The Abatement Contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every six months thereafter with the type of respirator he/she will be using.

F. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.

G. No facial hair, which interferes with the face-to-mask sealing surface, shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.

H. Contact lenses shall not be worn in conjunction with respiratory protection.

I. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the Abatement Contractor at the Abatement Contractor's expense.

J. Respiratory protection maintenance and decontamination procedures shall meet the following requirement:

1. Respiratory protection shall be inspected and decontaminated daily in accordance with OSHA 29 CFR 1910.134(b); and

2. HEPA filters for negative pressure respirators shall be changed after each shower; and

3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures; and

4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator facepieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations; and

5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted; and

6. Organic solvents shall not be used for washing of respirators.

K. No visitors shall be allowed to enter the contaminated area if they do not have their medical certification and training certificate. Authorized visitors shall be provided with suitable PAPR respirators and instructions on the proper use of respirators whenever entering the work area.

3.16 DISPOSAL OF WASTE

A. APPLICABLE REGULATIONS

1. All asbestos waste shall be stored, transported and disposed of as per, but not limited to, the following Regulations:

   a. NYS Code Rule 56

   b. U.S. Department of Transportation (DOT)
   Hazardous Substances
   Title 29, Part 171 and 172 of the code of Federal Regulations
   regarding waste collector registration

   c. Regulations regarding waste collector registration Title 6, part 364 of the New York State Official Compilation of Codes, Rules and Regulations – 6 NYCRR 364

   d. USEPA NESHAPS 40 CRF 61

   e. USEPA ASBESTOS WASTE MANAGEMENT GUIDANCE EPA/530-SW-85-007

B. TRANSPORTER OR HAULER - The Abatement Contractor shall bear full responsibility for proper characterization, transportation and disposal of all solid or liquid waste, generated during the project, in a legal manner. The Owner shall approve all transportation and disposal methods.

1. The Abatement Contractor's Transporter (hauler) and disposal site shall be approved by the Owner. The Abatement Contractor shall remove within 48 hours all asbestos waste from the site after completing the cleanup.

2. The Transporter must possess and present to the Owner’s representative a valid New York State Department of Environmental Conservation Part 364 asbestos hauler’s permit to verify license plate and permit numbers. The Owner’s representative will verify the authenticity of the hauler’s permit with the proper authority.

3. The Abatement Contractor shall give 24-hour notification prior to removing any waste from the site. All waste shall be removed from site only during normal working hours. No waste may be taken from the site without authorization from the Owner’s representative.

4. The Abatement Contractor shall have the Transporter give the date and time of arrival at the disposal site.

5. The Transporter with the Abatement Contractor and Owner's consultant shall inspect all material in the transport container prior to taking possession and signing the Waste Manifest. The Transporter shall not have any off-site transfers or be combined with any other off-site asbestos material.

6. The Transporter must travel directly to the disposal site with no unauthorized stops.

C. WASTE STORAGE CONTAINER

1. During loading and on-site storage, the asbestos waste container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2. The NYS DEC Hauler's Permit number shall be on both sides and back of the container.

3. The Container will not be permitted to leave the site without the proper signage.

4. A copy of the completed waste manifest shall be forwarded directly to the Owner's Consultant by the disposal facility.

5. Packaging of Non-friable Asbestos. Use of an open top container shall require written request, by the Contractor, and written approval by the Owners Representative, and be performed in compliance with all applicable regulations.

   a) A chute, if used, shall be air/dust tight along its lateral perimeter and at the terminal connection to the dumpster at ground level (solid wall and top container). The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

   b) The container shall be lined with a minimum of two (2) layers of 6 mil. Fire-retardant polyethylene draped loosely over the sides to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

   c) Prior to transport from the work site the Dumpster will be disconnected from the chute and sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

6. Packaging Friable Asbestos.

   a) The container shall be a solid wall, hard top and lockable container.

   b) The container shall be locked upon arrival at the site to restrict access. Security shall be provided at the entrance to the container during the loading process and immediately locked upon completion.

   c) The interior walls, floor and ceiling shall be lined with two (2) layers of 6 mil. Fire-retardant polyethylene.

d) The waste shall be loaded in such a manner as to protect the integrity of the individual waste packages.

e) Prior to transport from the work site the interior of the Dumpster will seal air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

D. WASTE DISPOSAL MANIFEST

1. The Asbestos Waste Manifest shall be equivalent to the "Waste Shipment Record" included in 40 CFR 61. A copy of the Contractor's manifest shall be reviewed by the Owner's Consultant and shall be the only manifest used.

2. The Manifest shall be verified by the Owner's Consultant indicating that all the information and amounts are accurate, and the proper signatures are in place.

3. The Manifest shall have the signatures of the Abatement Contractor and the Transporter prior to any waste being removed from the site.

4. The Manifest shall be signed by the Disposal Facility owner or operator to certify receipt of asbestos containing materials covered by the manifest.

5. A copy of the completed manifest shall be provided by the Abatement Contractor to the Owner's Consultant and remain on site for inspection.

6. Abatement Contractor shall maintain a waste disposal log which indicates load number, date and time left site, container size, type of waste, quantity of waste, name of hauler, NYS DES permit number, trailer and tractor license number, and date manifest was returned to consultant.

7. The Disposal Facility owner or operator shall return a signed copy of the Waste Manifest directly to:

   Eastchester Union Free School District
   580 White Plains Rd
   Eastchester, Ny 10709
   Attn. Elliot Sheldon
   Director Of Facilities & Operations
   ESHELDON@EUFSDK12.ORG

8. Copies of the completed Waste Manifest are to be sent by the disposal facility to the Hauler and Abatement Contractor.

9. Submit signed dump tickets and manifests with final payment request.

10. Final payment request will not be honored without signed dump ticket or manifests accounting for all asbestos waste removed from the site.

E. VIOLATIONS OF SPECIFICATIONS

1. Violations of the safety, hygiene, environmental, procedures herein, any applicable federal, state of local requirement s or failure to cooperate with the Owner's representative shall be grounds for dismissal and/or termination of this contract.

F. VIOLATIONS OF NO SMOKING POLICY

1. The Federal Pro Children Act of 1994 prohibits School District Officials from smoking in any buildings or on the grounds that is property of the School District. The district shall be considered smoke free. The School District strongly enforces its' No Smoking Policy. It is the Contractor's responsibility to inform all workers of this policy. Any worker(s) involved with this project that are found smoking or using tobacco products will be informed that they are in violation of the Federal and State Law and School Board Policy and will be removed from site.

3.17 LOCATION OF WORK – BASE BID – *(Please see attached Drawings for approximate locations)*

A. **The Waverly School**

Location	Quantity	Material
Area A-BAS		
OT/PT 001	20 LF	Pipe Insulation
OT/PT 001	7 SF	Mudded Joint Packing
Area B-1		
Faculty Room 110	20 LF	Pipe Insulation
Faculty Room 110	7 SF	Mudded Joint Packing
Faculty Room 110	30 SF	Floor Tile & Mastic
Faculty Room 110 – Walls & Ceiling	1000 SF	Plaster
Read AIS Classroom 112 & 112A	20 LF	Pipe Insulation
Read AIS Classroom 112 & 112A	7 SF	Mudded Joint Packing
Read AIS Classroom 112 & 112A	30 SF	Floor Tile & Mastic
Read AIS Classroom 112 & 112A – Walls & Ceiling	1000 SF	Plaster
Classroom 115	20 LF	Pipe Insulation
Classroom 115	7 SF	Mudded Joint Packing
Classroom 115	30 SF	Floor Tile & Mastic
Classroom 115 – Walls & Ceiling	1200 SF	Plaster
Girls Toilet 120	20 LF	Pipe Insulation
Girls Toilet 120	7 SF	Mudded Joint Packing
Girls Toilet 120 – Walls & Ceiling	500 SF	Plaster
Music Room 114	20 LF	Pipe Insulation
Music Room 114	7 SF	Mudded Joint Packing
Music Room 114	30 SF	Floor Tile & Mastic
Music Room 114 – Walls & Ceiling	1150 SF	Plaster
Boys Toilet 116	20 LF	Pipe Insulation
Boys Toilet 116	7 SF	Mudded Joint Packing
Boys Toilet 116 – Walls & Ceiling	500 SF	Plaster
Corridor – Walls & Ceiling	2600 SF	Plaster
Area B-2		
Classroom 206	20 LF	Pipe Insulation
Classroom 206 – Below Unit Ventilator	15 SF	Floor Tile & Mastic
Classroom 206	7 SF	Mudded Joint Packing
Classroom 206 – Walls & Ceiling	1200 SF	Plaster
Classroom 207	20 LF	Pipe Insulation
Classroom 207 – Below Unit Ventilator	15 SF	Floor Tile & Mastic

Classroom 207	7 SF	Mudded Joint Packing
Classroom 207 – Walls & Ceiling	1200 SF	Plaster
Girls Toilet 212	20 LF	Pipe Insulation
Girls Toilet 212	7 SF	Mudded Joint Packing
Girls Toilet 212 – Walls & Ceiling	1200 SF	Plaster
Classroom 208	20 LF	Pipe Insulation
Classroom 208 – Below Unit Ventilator	15 SF	Floor Tile & Mastic
Classroom 208	7 SF	Mudded Joint Packing
Classroom 208 – Walls & Ceiling	1200 SF	Plaster
Classroom 210	20 LF	Pipe Insulation
Classroom 210 – Below Unit Ventilator	15 SF	Floor Tile & Mastic
Classroom 210	7 SF	Mudded Joint Packing
Classroom 210 – Walls & Ceiling	1200 SF	Plaster
Boys Toilet 209	20 LF	Pipe Insulation
Boys Toilet 209	7 SF	Mudded Joint Packing
Boys Toilet 209 – Walls & Ceiling	500 SF	Plaster
Girls Toilet 212	20 LF	Pipe Insulation
Girls Toilet 212	7 SF	Mudded Joint Packing
Girls Toilet 212 – Walls & Ceiling	500 SF	Plaster
Janitorial Closet 214	20 LF	Pipe Insulation
Janitorial Closet 214	7 SF	Mudded Joint Packing
Janitorial Closet 214 – Walls & Ceiling	100 SF	Plaster
Corridor – Walls & Ceiling	2600 SF	Plaster

END OF LOCATION OF WORK

3.18 GENERAL

A. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to ceiling tiles, ceiling finishes, wall finishes, floor finishes, etc.

B. The Abatement Contractor shall be responsible for all demolition required to access materials identified in scope of work and on associated drawings.

C. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. Additional asbestos abatement performed prior to the order to proceed will not be acknowledged.

D. Asbestos Abatement Contractor will be responsible for total and complete removal and disposal of friable asbestos-containing Mudded Joint Packing and asbestos-containing Pipe Insulation on piping in chase walls as well as above ceilings systems.

E. Asbestos Abatement Contractor will be responsible for total and complete removal of asbestos-containing Wall and Ceiling Plasters including all metal laths and black iron to the substrate.

F. Asbestos Abatement Contractor will be responsible for total and complete removal of asbestos-containing Flooring Materials significantly concealed by, but not limited to baseboards, unit ventilators, casework, millwork, etc. shall be fully removed down to the substrate by the abatement contractor including mastics, floor fillers, and levelers, with removals performed to the visible edge of the next row of tiles at a minimum of 6 inches from the abated flooring, leaving a smooth edge to be sealed upon receipt of final air clearances.

G. Power tools used to drill, cut into or otherwise disturb asbestos containing material shall be equipped with HEPA filtered local exhaust ventilation.

H. The Abatement Contractor shall provide access to GFCI electrical power, required to perform the area air monitoring for this project, within and immediately adjacent to each work area.

I. Unwrapped or un-bagged ACM shall be immediately placed in an impermeable waste bag or wrapped in plastic sheeting.

J. Coordinate all removal operations with the Owner.

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

Asbestos Employee Medical Examination Statement
Certificate of Worker Release
Asbestos Employee Training Statement
CERTIFICATE OF WORKER'S ACKNOWLEDGEMENT

PROJECT NAME: **Eastchester UFSD – Phase 5a 2022 Capital Bond Improvements**

ABATEMENT CONTRACTOR'S
NAME:_____

WORKING WITH ASBESTOS INVOLVES POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER AND RESPIRATORY DISEASES. SMOKING CIGARETTES AND INHALATION OF ASBESTOS FIBERS INCREASES THE RISK THAT YOU WILL DEVELOP LUNG CANCER ABOVE THAT OF THE NON-SMOKING PUBLIC.

The Contract for this project requires the Abatement Contracting Company to: 1) supply proper respiratory protection devices, and training on their use, to their employees; 2) provide training on safe work practices, and on use of the equipment used on the project, to their employees; and, 3) provide annual medical examinations to their employees meeting the requirements of 29 CFR 1926.1101. The Abatement Contracting Company's signature on this certificate, documents that these contractual obligations are fulfilled, and that you understand the information presented to you.

**************DO NOT SIGN THIS FORM UNLESS YOU FULLY UNDERSTAND THIS INFORMATION**************

RESPIRATORY PROTECTION: I have been trained in the proper use and limitations of the type of respiratory protection devices to be used on this project. I have reviewed the written respiratory protection program manual and a copy is available for my use. Respiratory protection equipment has been proved, by the Contractor, at no cost to me.

TRAINING COURSE: I have been trained in the risks and dangers associated with handling asbestos, breathing asbestos dust, proper work procedures, personal protection and engineering controls. I have satisfactorily completed and Asbestos Safety Training Program for New York State and have been issued a New York State Department of Health Certificate of Asbestos Safety Training.

MEDICAL EXAMINATION: I have satisfactorily completed a medical examination within the last 12 months that meets the OSHA requirement for an asbestos worker and included at least 1) medical history 2) pulmonary function 3) medical examination 4) approval to wear respiratory protection devises and may have included an evaluation of a chest x-ray.

Signature: _____ Printed Name:
_____ Date: _____

Witness Signature: _____ Printed Name:
_____ Date: _____

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

ESTIMATE OF ACM QUANTITIES

PROJECT NAME: **Eastchester UFSD – Phase 5a 2022 Capital Bond Improvements**

****

EACH ABATEMENT CONTRACTOR SHALL READ AND ACKNOWLEDGE THE FOLLOWING NOTICE. A SIGNED AND DATED COPY OF THIS ACKNOWLEDGMENT SHALL BE SUBMITTED WITH THE ABATEMENT CONTRACTOR'S BID FOR THIS PROJECT. FAILURE TO DO SO MAY, AT THE SOLE DISCRETION OF THE OWNER, RESULT IN THE BID BEING CONSIDERED NON-RESPONSIVE AND RESULT IN DISQUALIFICATION OF THE ABATEMENT CONTRACTOR'S BID ON THIS PROJECT.

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*** **NOTICE** ***

The linear and square footages listed within this specification are approximates. Abatement Contractor is required to visit the work locations prior to bid submittal to take actual field measurements within each listed location. The Abatement Contractor shall base their bid on actual quantities determined, by them, at the site walkthrough. Estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project.

****

Acknowledgment: I have read and understand the above **NOTICE** regarding removal quantity estimates and understand that estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project. The Abatement Contractor's signatory represents to the Owner that he/she has the authority of the entity he/she represents to sign this agreement on its behalf.

Company Name: _____
Type or Print

BY: _____ _____ _____
Signature Title Date

Print Name: _____

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

END OF SPECIFICATION
SECTION 02 012

ASBESTOS ABATEMENT NOTES

PRE-ABATEMENT WORK NOTES:

1. THESE DRAWINGS HAVE BEEN PREPARED UTILIZING THE OWNERS' ORIGINAL CONSTRUCTION DOCUMENTS IN ORDER TO ILLUSTRATE THE EXISTING CONDITIONS OF THE SITE AND STRUCTURES THEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACTUAL VERIFICATION OF ALL EXISTING CONDITIONS IN THE FIELD.
2. THE CONTRACTOR SHALL DETERMINE EXACT FINAL LOCATIONS OF PERSONNEL AND WASTE DECONTAMINATION ENCLOSURES, PICK UP AREA FOR REFUSE AND ASBESTOS DEBRIS. THESE LOCATIONS SHALL BE REVIEWED AND PROPERLY APPROVED BY THE DISTRICT PRIOR TO COMMENCEMENT OF WORK. THIS CONTRACTOR SHALL ESTABLISH, LABEL AND MAINTAIN PROPER EXITS AND WAYS OF EGRESS WITHIN EACH WORK AREA FOR NORMAL AND EMERGENCY USE BY WORKERS DURING ALL ABATEMENT ACTIVITIES.
3. THE CONTRACTOR, PRIOR TO BIDDING SHALL BE RESPONSIBLE TO BECOME COMPLETELY FAMILIAR WITH ALL ASPECTS OF THE PROJECT, INCLUDING, BUT NOT LIMITED TO, ALL DEMOLITION AND CONSTRUCTION WORK AS SHOWN IN THE COMPLETE SET OF DRAWINGS AND IN THE PROJECT MANUAL / SPECIFICATIONS AND ASBESTOS SURVEY REPORTS IN ORDER THAT THE FULL SCOPE OF WORK WHICH MAY ENCOUNTER ASBESTOS CONTAINING MATERIALS IS UNDERSTOOD AND ACCOUNTED FOR, BY THE CONTRACTOR IN (UNDERTAKING)THIS PROJECT. A COPY OF THE ASBESTOS SURVEY REPORT CAN BE REQUESTED FROM THE OWNERS' ENVIRONMENTAL CONSULTANT.
4. PRIOR TO ABATEMENT ALL CONTRACTORS WILL SURVEY EXISTING CONDITIONS IN THE ABATEMENT AND GENERAL WORK AREAS. ITEMS / MATERIALS, ETC., DAMAGED OR NON-FUNCTIONAL SHALL BE LISTED, NOTED, PHOTOGRAPHED AND REVIEWED WITH THE PROJECT INSPECTOR. ALL OTHER ITEMS / MATERIALS SHALL BE REVIEWED WITH THE PROJECT INSPECTOR. ALL OTHER ITEMS / MATERIALS SHALL BE ASSUMED TO BE IN GOOD CONDITION AND WORKING ORDER. IT SHALL BE THE RESPONSIBILITY OF THE ABATEMENT CONTRACTOR TO MAINTAIN ALL MATERIALS, ITEMS, EQUIPMENT, SYSTEMS, ETC. IN THEIR ORIGINAL CONDITION AND RETURN TO OWNER/GENERAL CONTRACTOR, ETC., IN SAME CONDITION AT THE END OF THIS CONTRACT.

ASBESTOS REMOVAL GENERAL NOTES:

1. ASBESTOS ABATEMENT INDICATED ON THESE DRAWINGS SHALL BE PERFORMED BY A NYS DEPARTMENT OF LABOR LICENSED ASBESTOS ABATEMENT CONTRACTOR, WHO SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND QUANTITIES PRIOR TO BID.
2. THE CONTRACTOR SHALL PERFORM ALL CONTRACT WORK IN ACCORDANCE WITH CONTRACT SPECIFICATIONS, NEW YORK STATE DEPARTMENT OF LABOR (NYSDOL) INDUSTRIAL HEALTH CODE RULE 56, OSHA, NESHAPS, AHERA, NYSDEC AND ALL OTHER APPLICABLE CODES.
3. THE CONTRACTOR SHALL MAINTAIN THE SITE AS NEAT AS POSSIBLE AND ORDERLY DURING (THE COURSE OF)THE WORK. ALL LOOSE DEBRIS WHICH MAY (BECOME WINDBORNE) BLOW OFF THE SITE, SHALL BE COLLECTED AND DISPOSED OF PROPERLY BY THE CONTRACTOR ON A DAILY BASIS AS PART OF THE PROJECT WORK.
4. THE CONTRACTOR SHALL PROVIDE BARRIERS AROUND THE WORK AREAS IN ORDER TO ENSURE SAFE PASSAGE BY ANY PERSON. THESE BARRIERS SHALL ALSO SERVE TO KEEP ALL UNAUTHORIZED PERSONS OUT OF THE PROJECT AREA FOR THE DURATION OF THE WORK.
5. VARIANCES: CONTRACTOR SHALL PAY FOR AND OBTAIN ANY NECESSARY SITE SPECIFIC VARIANCES.
6. THE CONTRACTOR SHALL MAINTAIN SECURITY IN THE BUILDING AND THE WORK AREAS AT ALL TIMES.
7. PROJECT STAGING, STORAGE, SCHEDULING AND ACCESS SHALL BE COORDINATED WITH AND APPROVED BY THE ARCHITECT, CONSTRUCTION MANAGER AND OWNER PRIOR TO PROCEEDING WITH WORK.
8. SHOULD IT BECOME NECESSARY, THE CONTRACTOR SHALL COORDINATE SHUT DOWN AND LOCK OUT / TAG OUT OF THE ELECTRICAL POWER FROM THE OWNERS' POWER, WITH OWNERS' REPRESENTATIVE, PRIOR TO THE COMMENCEMENT OF WORK.
9. ALL TEMPORARY POWER TO THE WORK AREA SHALL BE BROUGHT IN FROM OUTSIDE THE WORK AREA THROUGH A GROUND-FAULT CIRCUIT INTERRUPTER AT THE SOURCE.
10. CONTRACTOR SHALL COORDINATE CONNECTION OF WATER SERVICE FOR DECONTAMINATION PURPOSES WITH OWNERS' REPRESENTATIVE. WATER FOR DECONTAMINATION UNITS IS AVAILABLE FROM THE OWNER.
11. THE OWNER OR OWNERS' REPRESENTATIVE IS RESPONSIBLE TO CONTRACT FOR NYSDOL PROJECTS MONITORING / AIR SAMPLING TECHNICIAN SERVICES AS REQUIRED.
12. CONTRACTOR TO PROVIDE A COPY OF SAFETY DATA SHEETS (SDS'S) FOR ANY CHEMICAL AGENTS TO BE USED DURING THE ASBESTOS ABATEMENT TO THE PROJECT MONITOR AND THE OWNER'S REPRESENTATIVE.
13. CONTRACTOR SHALL REQUEST AND RECEIVE PROJECT MONITOR AND OWNERS' REPRESENTATIVES APPROVAL OF ALL WORK BEFORE ANY ABATEMENT IS UNDERTAKEN.
14. UNDER NO CIRCUMSTANCES SHALL CONTAMINATED WASTE WATER BE DISCHARGED THROUGH A SYSTEM WITHOUT FILTERING. THE MAXIMUM FILTER SIZE OPENING SHALL BE CAPABLE OF RETAINING A 5.0 MICRON PARTICLE SIZE COLLECTION CAPABILITY.
15. DRAWINGS ATTEMPT TO INDICATE THE GENERAL SCOPE OF EXISTING CONDITIONS AND ITEMS AFFECTED BY THE ABATEMENT WORK. CONTRACTOR SHALL EXAMINE THE WORK AREA PRIOR TO FORMULATING HIS BID SHALL INCLUDE FIELD VARIATIONS FROM THOSE SHOWN WITHIN THE GENERAL INTENT OF THE WORK.
16. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL ASBESTOS CONTAINING MATERIALS CONTAINED WITHIN AND GENERATED FROM THE ABATEMENT PROJECT AND ASSOCIATED WITH ALL PROJECT WORK, IN COMPLIANCE WITH ALL APPLICABLE LAWS, RULES REGULATIONS AND ALL REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION.
17. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL ASBESTOS CONTAINING MATERIALS CONTAINED WITHIN AND GENERATED FROM THE PROJECT AND ASSOCIATED WITH ALL PROJECT WORK, IN THE MOST EFFICIENT AND COST EFFECTIVE METHOD POSSIBLE, WHICH ALSO COMPLIES WITH THE REQUIREMENTS LISTED ABOVE.

POST ABATEMENT WORK NOTES:

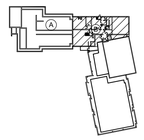
1. PROVIDE ALL APPLICABLE CODE RULE 56 PROCEDURES, CLEAN UP ANDADDITIONAL TESTING AS REQUIRED.
2. AFTER FINAL CLEARANCE HAS BEEN ATTAINED (SUBSTANTIAL COMPLETION) THE ABATEMENT CONTRACTOR, TOGETHER WITH THE PROJECT INSPECTOR AND OWNER'S REPRESENTATIVE WILL SURVEY FINAL CONDITIONS IN THE ABATEMENT AND GENERAL WORK AREAS. ITEMS / MATERIALS, ETC., DAMAGED OR NON-FUNCTIONAL SHALL BE LISTED, NOTED, PHOTOGRAPHED AND REVIEWED WITH THE PROJECT INSPECTOR. ALL OTHER ITEMS / MATERIALS SHALL BE REVIEWED WITH THE PROJECT INSPECTOR. ALL OTHER ITEMS / MATERIALS NOT NOTED, SHALL BE ASSUMED TO BE IN GOOD CONDITION AND WORKING ORDER. IT SHALL BE THE RESPONSIBILITY OF THE ABATEMENT CONTRACTOR TO MAINTAIN ALL MATERIALS, ITEMS, EQUIPMENT, SYSTEMS, ETC. IN THEIR ORIGINAL CONDITION AND RETURN TO OWNER/GENERAL CONTRACTOR, ETC., IN SAME CONDITION AT THE END OF THIS CONTRACT. ANY NEW DAMAGE OR MISSING EQUIPMENT SHALL BE NOTED AND THE COST OFFSET FROM THE CONTRACT.
3. REMOVE ALL TEMPORARY ENCLOSURES, BARRIERS, ETC. REINSTALL ITEMS/WORK PREVIOUSLY REMOVED. ALL TAPE AND ADHESIVE RESIDUALS TO BE REMOVED. TEST AND REPAIR.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE AGAINST DAMAGE TO THE EXISTING WORK TO REMAIN IN PLACE. ANY DAMAGE TO SUCH WORK SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ARCHITECT AND OWNER AT NO ADDITIONAL COST TO THE CONTRACT.
5. AT COMPLETION OF THE ABATEMENT WORK, A CONDITION SURVEY SHALL BE DONE BY ALL CONTRACTORS AND PROJECT INSPECTOR (SEE NOTE 2.) ANY VARIATION (I.E. DAMAGE BY THE CONTRACTOR) SHALL BE REPAIRED / RESTORED BY THE ABATEMENT CONTRACTOR.
6. THE CONTRACTOR SHALL, UPON COMPLETION OF THE REMOVAL, PROVIDE WRITTEN DOCUMENTATION (INCLUDING ALL APPROPRIATE THIRD PARTY TESTING RESULTS) THAT THE PROJECT WORK AREAS ARE COMPLETELY FREE OF ALL ASBESTOS CONTAINING MATERIALS (CONTEMPLATED FOR REMOVAL UNDER THIS PROJECT, OR PHASE) AT FINAL CLEARANCE.
7. THE CONTRACTOR SHALL PROVIDE RECORDS OF ALL ASBESTOS CONTAINING MATERIALS REMOVED FROM THE SITE, INCLUDING THE COMPOSITION AND VOLUMES OF DISPOSED MATERIALS AND THE FINAL DISPOSAL SITE(S).
8. FOR WORK THAT IS INSTALLED FOLLOWING ABATEMENT FINAL CLEARANCES, THE CONSTRUCTION MANAGER , CONTRACTOR, SUBCONTRACTORS AND SUPPLIERS SHALL REVIEW ALL PROPOSED PRODUCT SUBMITTALS TO ENSURE THEY COMPLY WITH CURRENT SED REGULATIONS AND DO NOT CONTAIN ASBESTOS AND SHALL CERTIFY TO THAT EFFECT ON THEIR SHOP DRAWING REVIEW STAMP. CORRECTIVE WORK TO REMOVE ASBESTOS THAT IS INCORPORATED INTO THE WORK IS THE RESPONSIBILITY OF THE PARTIES OVERSEEING AND PROGRESSING THAT WORK.

REV.	DATE	ITEM

NOTICE

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Consultant :
Quality Environmental Solutions & Technologies, Inc.
1376 Route 9 - Wappingers Falls, New York 12590
Tel: 845 - 298 - 6031



KEY PLAN

NOT TO SCALE

PROJECT
EASTCHESTER UNION FREE SCHOOL DISTRICT
PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
WAVERLY SCHOOL
EASTCHESTER / WESTCHESTER COUNTY

DWG TITLE
PROJECT ASBESTOS ABATEMENT NOTES

DRAWING BY: ANM
CHECK BY: LJH

NOTICE

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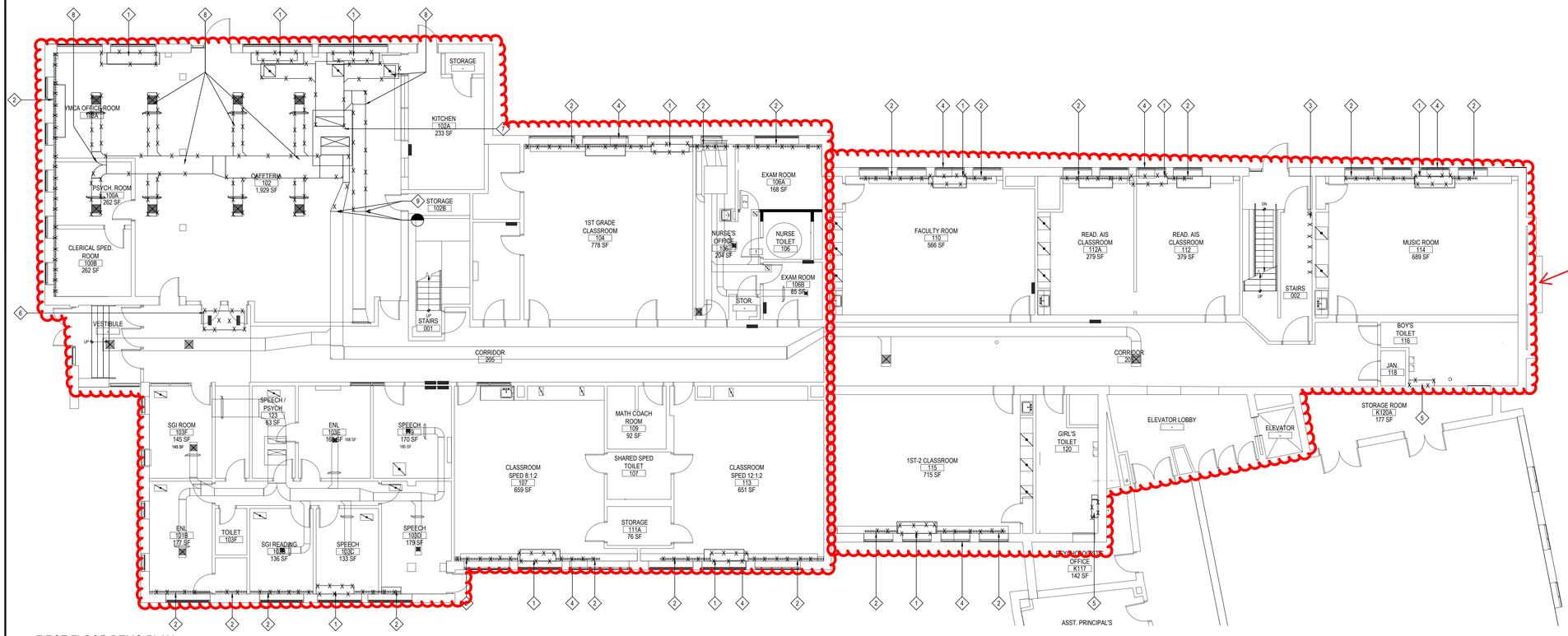
STATE OF NEW YORK
JOHN NICHOLAS MELILLO
LICENSED PROFESSIONAL ENGINEER
067037

EXPIRATION DATE 11-30-2028

SED No: 66-03-01-03-0-002-011
DISTRICT: EASTCHESTER UNION FREE SCHOOL DISTRICT
PROJECT: PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
DWG TITLE: PROJECT ASBESTOS ABATEMENT NOTES

SCALE: AS NOTED
DATE: October 5,2026
BID PICK-UP:
FILE No: 25-139a WVS

AA 0.00



FIRST FLOOR DEMO PLAN

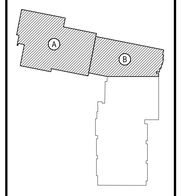
NOTE:

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REV.	DATE	ITEM

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KEY PLAN

NOT TO SCALE

PROJECT

EASTCHESTER UNION FREE SCHOOL DISTRICT
PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
WAVERLY SCHOOL
EASTCHESTER / WESTCHESTER COUNTY

DWG TITLE

DRAWING BY: ---

CHECK BY: ---

NOTICE

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EXPIRATION DATE 11-30-2028

SED No. 66-03-01-03-0-002-012

DISTRICT EASTCHESTER UNION FREE SCHOOL DISTRICT

PROJECT PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS

DWG TITLE Asbestos Abatement

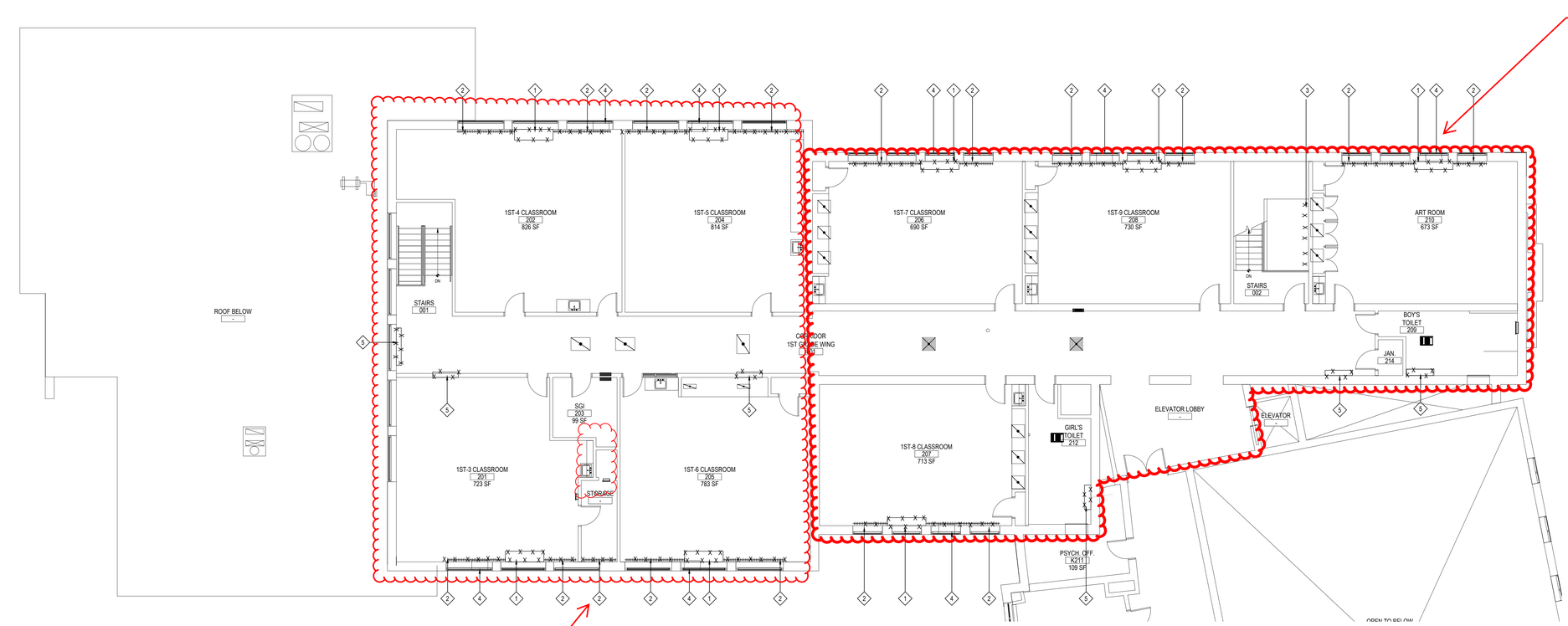
SCALE: AS NOTED

DATE: October 5, 2026

BID PICK-UP:

FILE No: 25-139A WVS

ASB 1.01



SECOND FLOOR DEMO PLAN

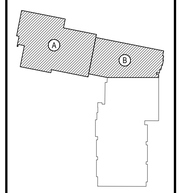
NOTE:

SCALE: 1/8" = 1'-0"

REV.	DATE	ITEM

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KEY PLAN

NOT TO SCALE

PROJECT

EASTCHESTER UNION FREE SCHOOL DISTRICT
PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
WAVERLY SCHOOL
EASTCHESTER / WESTCHESTER COUNTY

DWG TITLE

DRAWING BY: ---

CHECK BY: ---

NOTICE

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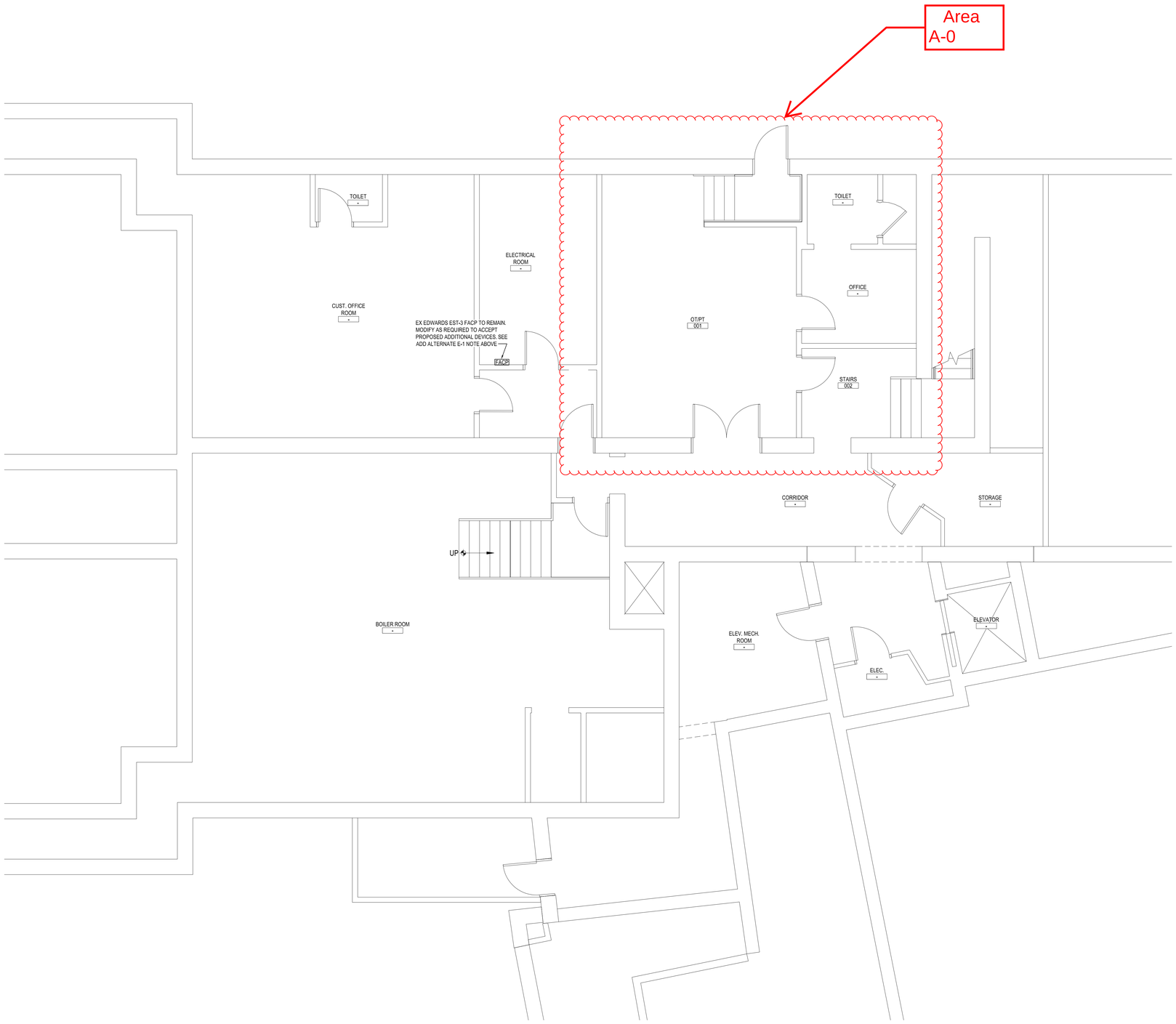


EXPIRATION DATE 11-30-2028

SED No.	66-03-01-03-0-002-012
DISTRICT	EASTCHESTER UNION FREE SCHOOL DISTRICT
PROJECT	PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
DWG TITLE	Asbestos Abatement

SCALE:	AS NOTED
DATE:	October 5, 2026
BID PICK-UP:	
FILE No:	25-139A WVS

ASB 2.01



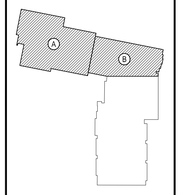
BASEMENT

SCALE: 1/4" = 1'-0"

REV.	DATE	ITEM

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KEY PLAN

NOT TO SCALE

PROJECT

EASTCHESTER UNION FREE SCHOOL DISTRICT
PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
WAVERLY SCHOOL
EASTCHESTER / WESTCHESTER COUNTY

DWG TITLE

DRAWING BY: MDA

CHECK BY: AG

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SED No.	66-03-01-03-0-002-012
DISTRICT	EASTCHESTER UNION FREE SCHOOL DISTRICT
PROJECT	PHASE 5a - 2022 CAPITAL BOND IMPROVEMENTS
DWG TITLE	Asbestos Abatement
SCALE:	AS NOTED
DATE:	October 5, 2026
BID PICK-UP:	
FILE No:	25-139A WVS

ASB 0.01

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NEW YORK STATE | Department of Labor

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

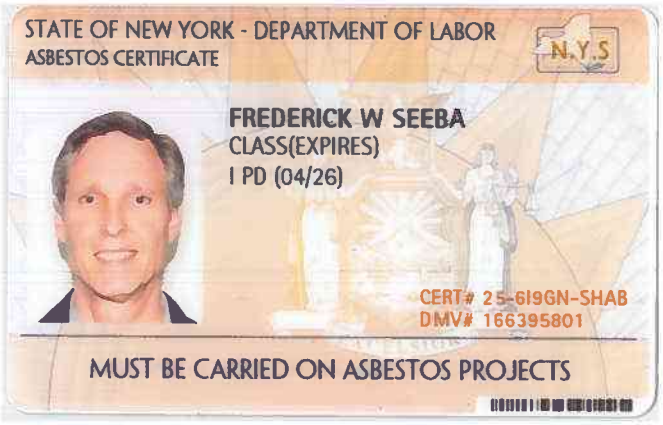
BBS Architects, Landscape Architects and Engineers P.C.
244 E Main Street, Patchogue, NY, 11772

License Number: 28654
License Class: RESTRICTED
Date of Issue: 03/18/2025
Expiration Date: 03/31/2026
Duly Authorized Representative: Frederick Seeba

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor


STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE
N.Y.S
FREDERICK W SEEBA
CLASS(EXPIRES)
I PD (04/26)
CERT# 25-6I9GN-SHAB
DMV# 166395801
MUST BE CARRIED ON ASBESTOS PROJECTS

DIVISION 02 – EXISTING CONDITIONS

SECTION 028218 – ABATEMENT OF ASBESTOS FLOORING/MASTIC SCRAPE METHOD

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Abatement of non-friable asbestos-containing flooring, base and mastic materials using manual scrape method.

B. Contractor shall coordinate all work with the Owner, Construction Manager, Asbestos Project Monitor, General Contractor, Flooring Contractor, Electrical Contractor, Mechanical Contractor, Plumbing Contractor, Window/Door Contractor, Roofing Contractor, and any other entity as necessary.

C. The work is to be phased by zones. Zones are to be isolated from other building areas by hard wall barriers. Place zone partitions to allow at least two exits from each zone.

D. The Contractor shall file applications for all necessary permits as required by all administrative authorities and enforcing agencies. The Contractor is required to fulfill any format necessary as well as to pay all required fee.

E. The Contractor is responsible to secure required variances.

F. The Contractor shall be responsible for verifying the bid document drawing(s) provided and identifying any additional ACM that may exist. The proposals based upon these specifications shall be held as made with full knowledge of existing conditions and requirements.

G. The Contractor shall field verify, prior to bid submission, all quantities of asbestos containing material to be removed, and all field conditions affecting the work. Any discrepancies between the Contract Documents and the field conditions shall be reported to the Architect in writing prior to the submission of bids.

1.02 RELATED SECTIONS

A. The following sections are related to this work of this section, although the work of this section with its specific techniques and Applicable Variance, may supersede provisions contained in related sections.

1. 028000 – Asbestos Work Under This Contract

2. 096519 – Resilient Flooring

1.03 APPLICABLE STANDARDS

A. The following standards cover the work of this section, depending on project location.

B. State of New York

1. NYS Industrial Code Rule 56

2. NYS Commissioner of Education Regulations 155.5 (For NYS School District projects)

C. State of Connecticut (when project located in CT)

1. RCSA Title 19a and Title 20

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL

A. Set up containment and prep the work site pursuant to ICR 56-11.7.

1. Typically, a site-specific variance is not required for non-abrasive methods.

B. Coordinate all activities with the Owner's Project Monitor.

3.02 REMOVALS

A. Abate flooring, base, and mastic in accordance with ICR and applicable standards.

B. Manual scraping with amended water method shall be utilized.

C. It is recognized that full removal of mastic is not probable via this method. Extent and acceptable effort will be verifed by the Owner's Project Monitor prior to break down and demobilization.

3.03 COORDINATION

A. Communicate with subsequent trades regarding condition of substrate after abatement.

1. GC or flooring trades should expect that additional preparation, priming and flash-patching will be required of them in order to create a surface acceptable for new flooring and ahdesives.

2. GC or flooring trades are prohibited from any activities which physically disturbs or dislodges any residual floor mastic materials.

3.04 RESTORATION

A. Restore any damaged items or site to condition prior to work.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 028219 – ABATEMENT OF ASBESTOS FLOORING/MASTIC LIQUID CHEMICAL SCRAPE METHOD

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Abatement of non-friable asbestos-containing flooring, base and mastic materials using liquid chemical mastic remover.

B. Contractor shall coordinate all work with the Owner, Construction Manager, Asbestos Project Monitor, General Contractor, Flooring Contractor, Electrical Contractor, Mechanical Contractor, Plumbing Contractor, Window/Door Contractor, Roofing Contractor, and any other entity as necessary.

C. The work is to be phased by zones. Zones are to be isolated from other building areas by hard wall barriers. Place zone partitions to allow at least two exits from each zone.

D. The Contractor shall file applications for all necessary permits as required by all administrative authorities and enforcing agencies. The Contractor is required to fulfill any format necessary as well as to pay all required fee.

E. The Contractor is responsible to secure required variances.

F. The Contractor shall be responsible for verifying the bid document drawing(s) provided and identifying any additional ACM that may exist. The proposals based upon these specifications shall be held as made with full knowledge of existing conditions and requirements.

G. The Contractor shall field verify, prior to bid submission, all quantities of asbestos containing material to be removed, and all field conditions affecting the work. Any discrepancies between the Contract Documents and the field conditions shall be reported to the Architect in writing prior to the submission of bids.

1.02 RELATED SECTIONS

A. The following sections are related to this work of this section, although the work of this section with its specific techniques and Applicable Variance, may supersede provisions contained in related sections.

1. 028000 – Asbestos Work Under This Contract

2. 035416 – Self-Levelling Cementitious Underlayment

3. 096519 – Resilient Flooring

1.03 APPLICABLE STANDARDS

A. The following standards cover the work of this section, depending on project location.

B. State of New York

1. NYS Industrial Code Rule 56

2. NYS Commissioner of Education Regulations 155.5 (For NYS School District projects)

C. State of Connecticut (when project located in CT)

1. RCSA Title 19a and Title 20

PART 2 - PRODUCTS

2.01 GENERAL

A. Design is based on use of Chemsafe 310C soy-based mastic remover. Such reference shall be construed only as establishing the quality of materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

PART 3 - EXECUTION

3.01 GENERAL

A. Set up containment and prep the work site pursuant to applicable standards and ICR Applicable Variance 3 (AV-A-3).

1. Typically, a site-specific variance is not required for non-abrasive methods (floor buffer <300RPM).

B. Coordinate all activities with the Owner's Project Monitor.

3.02 REMOVALS

A. Abate flooring, base, and mastic in accordance with AV-A-3.

B. Utilize Chemsafe 310C to emulsify and remove mastic remaining on floor substrate.

1. Do not use amount of product more than necessary and do not leave on substrate longer than necessary.

C. Grind remaining mastic with a low-speed floor buffer (<300RPM) using low abrasion pads, as required by AV-A-3.

D. Full removal of mastic is required, and will be verifed by the Owner's Project Monitor prior to break down and demobilization.

3.03 COORDINATION

A. Communicate with subsequent trades regarding condition of substrate after abatement.

1. GC or flooring trades should expect a period of time for drying or airing-out after abatement.

2. GC or flooring trades should expect that additional preparation, encalsulation, priming, and self-levelling underlayment will be required of them in order to create a surface acceptable for new flooring and ahdesives.

3.04 RESTORATION

A. Restore any damaged items or site to condition prior to work.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 028300 – ABATEMENT OF SAND CELLARS/CRAWLSPACES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Abatement of friable asbestos-containing thermal systems insulation (TSI) and contaminated stored material within basements, cellars, and/or crawlspaces with sand-floors. Such TSI may be:

1. On the sand floor, or partially buried by it,
2. On piping, intact,
3. On piping, damaged or deteriorated.

B. Sealing sand floors with plastic sheeting/vapor barriers as an isolation membrane.

C. Reinsulating the piping, including such portions of piping that were originally, but not currently insulated.

1.02 RELATED SECTIONS

A. The following sections are related to this work of this section, although the work of this section with its specific techniques and site-specific variance, may supersede provisions contained in related sections.

1. 028000 – Asbestos Work Under This Contract
2. 220719 – Plumbing Insulation
3. 232113 – Hydronic Piping

1.03 APPLICABLE STANDARDS

A. The following standards cover the work of this section, depending on project location.

1. State of New York
    a. NYS Industrial Code Rule 56
    b. NYS Commissioner of Education Regulations 155.5
2. State of Connecticut (when project located in CT)
    a. RCSA Title 19a and Title 20

PART 2 - PRODUCTS

2.01 GENERAL

A. Design is based on use of certain Stego Industries products. Such reference shall be construed

only as establishing the quality of materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

1. StegoCrawl Wrap, 15-mil, extruded plastic sheeting/vapor barrier
    a. Class A fire-rated
    b. ASTM E1745 compliant
    c. ASTM F1249 compliant, Class 1, less than 0.01 perms
2. StegoCrawl Tape, 8-mil, for sealing, seaming, and patching
    a. ASTM D882 ultimate tensile strength 28 lb/in width
    b. ASTM D882 elongation at break 995%
3. StegoTack Tape, 30-mil, for sealing to walls/piers
    a. ASTM D1000 adhesion 12.5 lb/in width
4. StegoCrawl Term Bar, for mechanically fastening StegoCrawl Wrap
    a. Semi-flexible PVC
    b. 42” x 1.125” bar size
    c. Pre-drilled holes @ 6” o.c.

B. The plastic sheeting/vapor barrier system is not intended to function as a barrier to water vapor emitted from the sand. It is intended to be a durable, continuous isolation membrane to prevent sand disturbance and potential releases of remaining asbestos fibers from the sand during the Owner’s routine maintenance activities.

PART 3 - EXECUTION

3.01 GENERAL

A. The areas of work shall be indicated in the Construction Drawings.

B. If not already contained in the Bid Documents, the Contractor shall file for a site-specific variance to relieve requirements such as full containment as is customary for such work. Provide a copy of the granted variance to the Owner’s Project Monitor prior to posting notification of the project.

C. Set up containment and prep the work site pursuant to applicable standards and granted site-specific variance.

D. Coordinate all activities with the Owner’s Project Monitor.

E. It is the Contractor's responsibility to visit the site and quantify and/or make appropriate assumptions for bidding. If any quantities are given in the Construction Drawings or Project Manual, they are not necessarily accurate and are not to be used as the sole basis for bidding.

3.02 ABATEMENT/REMOVAL SCOPE

A. Abate TSI in accordance with applicable standards and granted site-specific variance.

B. Clean and dispose of contaminaed stored materials, furniture, debris, etc.

C. Clean all functioning mechanical and refrigeration equipment to remain.

D. Rake all sand areas to remove/expose TSI or debris for abatement.

3.03 DOL VARIANCE ASSUMPTIONS

A. For bidding, the Contractor may presume the following historically common parameters permitted under variances by the DOL.

1. A personal and waste decontamination facility will be utilized and will comply with 56-7.5 for each work area. Decontamination units will be sized for a large project. Units will be attached to the work area. Install isolation barriers of 6-mil fire-retardant plastic sheeting.

2. All moveable objects will be removed from the work area. Non-porous items may be wet-wiped and HEPA vacuumed and disposed of as non-ACM debris. Porous items must be placed in double bags and disposed of as ACM waste.

3. HEPA negative air filtration shall be provided to a minimum of 8 air changes per hour.

4. Residual TSI and debris found in the sand shall be wetted with amended water during removal. Sand in the areas surrounding TSI or debris shall be removed and disposed of as ACM waste.

5. Any piping that has not been reinsulated in the past with non-asbestos insulation shall be inspected and cleaned. Any suspect insulation residue shall be removed.

6. Concrete walls, columns, and ceilings shall be appropriately cleaned.

7. During Phase IIC in addition to the requirements of Subpart 56-4.9(c), air monitoring within the work area shall be conducted daily for the entire work shift. The number of required inside work area air samples shall be consistent with the size of the work area. The inside the work area sample location shall be distributed throughout the work area.

8. In lieu of post abatement clearance air monitoring in compliance with ICR 56-9.2(d), the most recent daily abatement air samples collected during cleaning operations in the regulated work area shall be used for comparison with ICR 56-4.11 clearance criteria. All other applicable provisions of ICR 56-4 shall be followed for the duration of the abatement project.

9. After removal and cleanings are complete and a minimum drying period has elapsed, an authorized and qualified Project Monitor shall determine if the area is dry, the scope of work complete and free of visible asbestos debris/residue. If the area is determined to be acceptable and the most recent daily abatement air sample results meet 56-4.11 clearance criteria, the final dismantling of the site may begin.

3.04 ISOLATION MEMBRANE

A. Rake sand to a reasonable level condition.

B. Membrane shall be (1) layer of 15-mil StegoCrawl Wrap.

C. Seams shall be lapped and taped with StegoCrawl Tape.

D. Edges shall be brought 12” up the walls, piers, columns, or other fixed building items, adhered with StegoTack Tape, and fastened with StegoCrawl Term Bars, continuously.

1. Term Bars shall be fastened at every other pre-drilled hole (12” o.c.) with Tapcon screws or similar.

3.04 RESTORATION

A. Restore any damaged items or site to condition prior to work.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

SECTION 029000 – LEAD WORK UNDER THIS CONTRACT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Unless specifically noted per Section 1.03, any disturbance of lead-based paint or lead containing building materials shall be considered a Lead Renovation, as defined by 40 CFR Part 745.

B. All Lead Renovations must be performed by an EPA Licensed Lead Renovation Firm utilizing an EPA Certified Lead Renovator in accordance with 40 CFR Part 745 Subpart E.

C. In addition, the contractor shall perform all work in accordance with all applicable federal, state, and local regulations, including but not limited to:

1. EPA 40 CFR Part 745
2. EPA Resource Conservations and Recovery Act (RCRA)
3. OSHA 29 CFR 1910 Occupational Safety and Health Standards
4. OSHA 29 CFR 1926 Safety and Health Regulations for Construction
5. NYSDEC 6 NYCRR Part 360 Solid Waste Management Facilities
6. NYSEC 6 NYCRR Part 364 Waste Transporters
7. NYSEC 6 NYCRR Part 370-375 Hazardous Wastes

In the event of any conflict or inconsistency between any of these regulations, the most stringent rule/procedures shall apply.

D. The contractor is responsible to provide all labor, materials, and equipment, including electrical and water utilities to the work areas. All fees and or fines associated with required permits, agency notifications, etc. are also the responsibility of the contractor.

E. The contractor shall provide copies of all permits, agency notifications, licenses, building postings, and proposed abatement schedule to the owner/owner's representative at least ten (10) business days but no more than sixty (60) calendar days prior to mobilization.

F. The following work practices are specifically prohibited:

1. Open flame burning or torching
2. Sanding, grinding, planning, needle gunning, or blasting with power tools and equipment not equipped with a shroud and HEPA vacuum attachment
3. Using a heat gun at temperatures greater than 1100°F

G. The contractor shall sufficiently contain all work areas so that dust and debris do not escape that area. For exterior renovations, the contractor shall ensure all operable doors, windows, as well as HVAC air intakes are effectively sealed or powered off while lead disturbance is in progress. Additionally, no lead containing debris shall be allowed to contact any ground surfaces.

H. A general workplan describing the contractor's means/methods for controlling dust/debris shall be provided to the owner/owner's representative at least ten (10) business days prior to the commencement of lead renovations.

I. The owner reserves the right to retain the services of a 3rd party to perform environmental testing during and after the scope of work is completed. The contractor is required to ensure cooperation

of its personnel and shall abide by the findings of the 3rd party as well as unsatisfactory sample results.

J. Clearance samples collected by the owner's 3rd party environmental testing firm shall be wipe samples compared with the clearance criteria established by the EPA and HUD. Wipe samples shall be collected at the completion of the lead renovation activities but prior to the reoccupancy of the space by building staff/students. Wipe samples shall be at the discretion of the sampler and shall include locations both within the work area as well as outside the work area along the contractors' pathway exiting the building.

K. Clearance for exterior renovations shall include a visual inspection of exterior surfaces. If doors/windows were not effectively sealed or nearby HVAC systems not powered down during the renovation, wipe samples inside the building will be collected.

L. Any costs associated with the repeated inspections, labor, and sampling by the 3rd party environmental testing firm due to the contractor's failure to properly clean the work areas will be back charged to the contractor.

M. The Lead Renovation Contractor is responsible for the work area until satisfactory clearance is achieved. Any recleaning of the work area is the responsibility of the contractor under all circumstances.

N. Copies of all reports/records required by EPA 40 CFR 745 Subpart E must be submitted to the owner or owners representative at the completion of the project.

1.02 SCOPE OF WORK

A. The scope of work shall be defined by the construction/renovation to be performed. The contractor shall reference the approved project drawings for all locations of lead containing materials. Unless otherwise noted, the contractor is not required to fully remove all lead containing materials and may minimize to the extent possible any disturbance associated with their scope of work.

B. The contractor shall provide, in writing, a description of each location where lead containing materials will be disturbed as part of their scope of work, based upon their means and methods to be used.

C. All costs associated with the improper/accidental disturbance/handling of lead containing materials shall be back charged to the contractor.

D. Working hours shall be as required and approved by the Owner. Lead renovation activities including, but not limited to, work area preparation, disturbance/removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

E. The timing/phasing of individual work areas shall be communicated with the owner/owner's representative. The contractor shall provide cooperation to ensure efficient turnover of cleared work areas to the other trades and or the owner.

F. All lead containing material locations are descriptive and/or diagrammatic. All measurements and quantities are approximate. Exact locations and quantities should be field verified by the Contractor.

G. The contractor shall reference the Information Available to Bidders section for the lead pre-construction report contained for details pertaining to lead testing results. If there is any confusion,

or the contractor encounters materials not specifically identified in the pre-construction report, the contractor shall stop work until the materials can be evaluated by the owner/owner's representative.

1.03 LEAD ABATEMENT (ONLY WHEN INDICATED AS SUCH)

A. Only when specially designated on the Construction Drawings is the work classified as a Lead Abatement.

B. Lead abatement is defined as any measure or set of measures designed to permanently eliminate lead-based paint hazards.

C. Any lead abatement shall be performed by EPA Licensed Lead Abatement Firm utilizing EPA Certified Lead Abatement Supervisors and Workers in accordance with 40 CFR Part 745 Subpart L.

D. All work shall be performed in strict accordance with the United States Department of Housing and Urban Development (USHUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition).

E. The contractor shall provide copies of all permits, agency notifications, licenses, building postings, and proposed abatement schedule to the owner/owner's representative at least ten (10) business days prior to mobilization.

F. The lead abatement contractor shall sufficiently contain all work areas so that dust and debris do not escape that area. A general workplan describing the contractor's means/methods for controlling dust/debris shall be provided to the owner/owner's representative at least ten (10) business days prior to the commencement of lead renovations.

G. The lead abatement contractor shall provide Safety Data Sheets (SDS) for all cleansers and encapsulants to be used prior to their delivery onsite. Any changes/substitutions must be approved by the owner or the owner's representative.

H. All containments must remain in place until satisfactory clearance results from wipe samples collected by the owner's 3rd party environmental monitor.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 030100 – CONCRETE SURFACE PREPARATION FOR COATING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this Section of the Specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this Section and other related work in connection with cleaning and preparation of concrete to provide a clean, contamination-free surface suitable for the application of coatings.

1. The Contractor shall remove all water, dirt, paint, grease, oils, loose concrete, and previous coatings from the surfaces to be coated to the satisfaction of the coating manufacturer and the Architect.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.03 RELATED SECTIONS

A. If concrete reconstruction is required on job prior to coating:

1. Section 030130 – Concrete Reconstruction and Resurfacing
2. Section 030130.11 – Cementitious Concrete Finish Coating; *OR*
3. Section 030130.12 – Elastomeric Concrete Finish Coating; *OR*
4. Section 030130.13 – Acrylic Concrete Finish Coating

1.04 APPLICABLE STANDARDS

A. ASTM Standards:

1. D4258 - Practice for surface cleaning concrete for coating.
2. D4259 - Standard Practice for Abrading Concrete.
3. D4285 - Test method for indicating oil or water in compressed air.

1.05 SUBMITTALS

A. Submittals shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. The Contractor shall submit the cleaning procedure, in accordance with this specification, outlining methods, equipment and materials to be used for cleaning of concrete to the Architect for approval prior to the commencement of work.

C. Submit manufacturer’s data for products including application instructions.

D. Contractor shall perform full cleaning procedure on a selected sample area to verify acceptability prior to proceeding with full scope of cleaning.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

A. Steam Cleaning: Remove heavy deposits of grease and oil as well as other water-soluble surface contaminants and emulsifiable materials with a jet of high-pressure steam in accordance with ASTM D4258.

B. Detergent water cleaning may be performed in lieu of steam cleaning provided the contractor demonstrates that the proposed product(s) and procedure yields similar results to steam cleaning that are acceptable to the architect.

C. Detergent water cleaning shall consist of scraping of heavy deposits of grease or oil and cleaning the surface with a stiff-bristled brush using an aqueous solution of detergent or non-solvent emulsifier. Immediately after treatment, before the surface dies, residues of the cleaning agent shall be removed by thoroughly flushing the surface with clean potable water.

D. Prior to detergent water washing, provisions must be made for the removal of waste wash water and contaminates generated by this cleaning method.

E. The use of acids for cleaning or preparing surfaces is not permitted.

F. Correct fins and protruding irregularities by mechanical means.

3.02 ABRASIVE BLAST CLEANING:

A. Abrasive blast cleaning is required when the Surface Preparation above is alone insufficient to provide a clean, acceptable surface for coating or if abrasive blasting, sand blasting, or shot blasting is specifically required by the Drawings or other specification sections. In any case, all costs associated with abrasive blast cleaning shall be borne by the contractor and included in the bid.

B. Clean concrete surfaces in accordance with Surface Preparation section above.

C. Erect temporary containment barriers suitable to the project to capture all spent blast media and particulate matter.

1. The Contractor shall be fully responsible for any and all contamination to adjacent properties and shall clean and make all necessary repairs to same at no expense to the Owner.

D. Concrete surface may be wet or dry as appropriate to the type of equipment to be used.

E. Apparatus: Typical methods are wet or dry open blast cleaning with nozzles and self-contained recirculating blast cleaning apparatus.

F. The compressor shall supply a minimum pressure, in the hose, of 620 KPa within 36” of the nozzle.

G. The air stream used for nozzle blast cleaning shall be free of oil, verified using ASTM test method d4285.

H. Nozzles shall be a minimum of diameter of 8mm.

I. Hoses shall be a minimum inside diameter of 40mm.

J. Abrasives shall be metallic, garnet, or resin-coated silica sand. Uncoated silica sand is specifically disallowed.

K. The intent is to remove sufficient material in order to achieve a sound concrete or masonry surface free of existing coatings, laitance, glaze, efflorescence, and incompatible concrete curing compounds or form release agents.

3.03 POWERWASHING

A. Powerwashing may be performed in lieu of abrasive blasting provided the contractor demonstrates the proposed procedure yields similar results to abrasive blasting that are acceptable to the coating manufacturer and the architect.

B. Clean concrete surfaces in accordance with Surface Preparation section above.

C. Apparatus shall be a piston-type positive displacement pump, high-pressure water blasting unit.

3.04 APPEARANCE OF PREPARED CONCRETE SURFACE

A. Concrete surface shall have a minimally roughened texture. A roughness standard shall be established by mutual agreement between the Architect and Contractor.

B. Some aggregate may be exposed and bug holes shall be opened.

C. Post-preparation cleaning: Clean in accordance with ASTM D4258 to remove loose material.

3.05 INSPECTION

A. Visually examine the prepared surface for loose adhering concrete, thin crusts bridging voids, fins, and projections.

B. Visually examine the prepared surface for paint, oil, grease, and markings.

3.06 ACCEPTANCE

A. Acceptable surface shall be free of paint, laitance, oil, grease, and other materials incompatible with the coating. The surface shall also be free of fins, projects, and loosely adhering, concrete, dirt, and dust particles.

B. The surface shall have a smoothed, textured appearance, roughened only where unavoidable. Aggregate may be exposed, only where unavoidable. Bug holes shall be opened.

C. The resulting surface condition must allow the coating manufacturer to provide acceptance in writing. Cleaning, abrasive blasting and/or powerwashing must be repeated as required to obtain acceptance.

D. The final appearance shall be similar to the standard established by mutual agreement between the Architect and the Contractor upon review and acceptance of the sample panel cleaned under 1.05.D.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 030130 – CONCRETE RECONSTRUCTION AND RESURFACING (NON-STRUCTURAL)

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this Section of the Specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this Section and other related work in connection with non-structural concrete reconstruction and resurfacing as shown on the drawings and/or specified herein.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.03 RELATED SECTIONS

A. If finish coatings are required on job:

1. Section 030100 – Concrete Surface Preparation for Coating
2. Section 030130.11 – Cementitious Concrete Finish Coating; *OR*
3. Section 030130.12 – Elastomeric Concrete Finish Coating; *OR*
4. Section 030130.13 – Acrylic Concrete Finish Coating.

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

1. Submit manufacturer's product data, specifications, installation instructions, MSDS, and samples for each component.

2. Submit two (2) copies of the manufacturer's guarantee agreeing to replace coatings and repair materials in the event of failure in materials or workmanship for five (5) years from within 12 months of date of acceptance.

1.05 QUALITY ASSURANCE

A. A representative of the manufacturer of the protective coating, other than the contractor, must be present at the site during the initial application of the protective coating and periodically thereafter, at intervals to be approved by the Architect.

B. Upon completion of this work, the Contractor shall secure a letter of certification from the manufacturer that all work has been done to the product manufacturer's satisfaction. This letter of certification must be filed with the Architect before final acceptance.

C. Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. All workmen involved in the application of the coating shall have received training by the manufacturer.

PART 2 - MATERIALS

2.01 MANUFACTURER

A. Design is based on the use of products as manufactured by Sika Corporation and the terminology used may include reference to that manufacturer's proprietary products. Such reference shall be construed only as establishing the quality of materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

1. Materials:

a. “Sika Armatec 110 Epocem”; a solvent free, epoxy-modified, cementitious, anti-corrosion coating for reinforcement steel.

b. "SikaRepair SHA with Latex R"; a two component, polymer modified cementitious repair mortar, for all vertical and overhead hand applied applications.

c. “Sikacrete 211 SCC Plus”; a one component, polymer modified, silica fume enhanced, self-consolidating, repair mortar with an integral migrating corrosion inhibitor, for form and pour applications.

d. “SikaQuick 1000”; a two component, polymer modified cementitious repair mortar, with a migratory corrosion inhibitor, for horizontal concrete repair applications.

2. Alternate acceptable product: "SW-82" or "SW-88" latex modified repair mortar and other associated primer and repair products as manufactured by Strongwall Industries, Inc.

2.02 PRODUCT DATA

A. **Sika Armatec 110 Epocem**:

Two coats of are required for protection of reinforcement steel. Sika Armatec 110 Epocem is recoatable generally 2 hours after the initial application. Application of concrete repair materials may also proceed at this time. At elevated temperatures, the re-coat and overlay times will be reduced. The minimum application temperature for Sika Armatec 110 Epocem is 40°F (5°C) and rising. Consult the technical data sheet or the local Sika Corporation office for further information.

1. Properties:

Test Method	Typical Result
Density mixed:	125 lb/cu. ft.
Recommended thickness per coat:	20 mils
Total application thickness;	40 mils
Drying Time @ 73°F (20°C):	2 hours
Color:	Concrete Grey
Pot Life:	90 minutes
Time to Corrosion Study	40% corrosion reduction

*All application and performance values are typical for the material but may vary because of variations in test methods, conditions, and configurations.

B. **SikaRepair SHA with Latex R**:

SikaRepair SHA with Latex R may be applied in sections up to 3 inch (75mm) thickness in vertical locations and up to 1½" inch thickness in overhead locations in a single application without the use of formwork. Thicker sections may be achieved by the use of formwork or the SikaRepair SHA with Latex R may be built up in layers. The final thickness is dependent on the material consistency and substrate profile. Deep spalls may sometimes be filled in a single application, depending on the actual configuration of the spall and the volume of exposed reinforcing steel. The material should not be applied at less than 3/8 inch (10mm).

1. Properties: The following results were obtained at 73°F and 50% relative humidity.

Test Method	Typical Result
Density (wet):	106 lbs./ft^3
Compressive Strength @ 28 days ASTM C-109:	5,000 psi
Slant Shear Bond Strength, ASTM C-882 modified 28 days:	1,800 psi
Flexural Strength, ASTM C-293, 28 days:	1,100 psi
Finishing time:	20-30 minutes
Pot Life:	Approx. 10-15 minutes

*All application and performance values are typical for the material but may vary because of variations in test methods, conditions, and configurations.

C. **Sikacrete 211 SCC Plus**:

Sikacrete 211 SCC Plus may be applied in sections up to 8 inches in thickness with the use of formwork. Thicker sections may be achieved by applying the material in layers. The material should not be applied at less than 1 inch.

1. Properties: The following results were obtained at 73°F and 50% relative humidity.

Test Method	Typical Result
Compressive Strength @ 28days ASTM C-109:	7,000 psi
Slant Shear Bond Strength, ASTM C-882 modified 28 days:	2,500 psi
Flexural Strength, ASTM C-78, 28 days:	1,000 psi
Splitting Tensile Strength, ASTM C-496:	1,000 psi
Application Time:	Approx. 60 minutes
Initial Spread:	Approx. 27-33 inches

*All application and performance values are typical for the material but may vary because of variations in test methods, conditions, and configurations.

D. **SikaQuick 1000**:

SikaQuick 1000 may be applied neat up to one inch thick. Applications greater than one inch and up to 6" thick requires the addition of 25 pounds of 3/8" clean, course, well graded, saturated surface dry, non reactive aggregate. Thicker sections may be achieved by applying the material in

layers. The material should not be applied at less than 1/4 inch.

1. Properties: The following results were obtained at 73°F and 50% relative humidity.

Test Method	Typical Result
Compressive Strength @ 28 days ASTM C-109:	5,500 psi
Slant Shear Bond Strength, ASTM C-882 modified 28 days:	2,700 psi
Flexural Strength, ASTM C-78, 28 days:	1,000 psi
Splitting Tensile Strength, ASTM C-496, 28 Days:	1,100 psi
Application time:	Approx. 20-30 minutes

*All application and performance values are typical for the material but may vary because of variations in test methods, conditions, and configurations.

PART 3 - EXECUTION

3.01 APPLICATION INSTRUCTIONS

A. Preparation:

1. All surfaces should be free from contamination such as paint, oil, grease, loose particles, decayed matter, moss, algae growth, laitance, and all traces of form release oils and curing compounds.

   a. Refer to Section 030100 – Concrete Surface Preparation for Coating.

2. Expose steel reinforcement fully to 100 percent of its circumference for all corroded steel in the repair area and remove all loose scale and corrosion deposits. The depth cut behind the reinforcement steel shall not be less than 3/4". Steel should be cleaned to a SSPC-SP10, Near White Metal Specification condition, paying particular attention to the back of exposed steel bars. Abrasive blasting shall be used for this process. If hand tool cleaning, use an SSPC-SP2 specification and if power tool cleaning, use an SSPC-SP3 specification. Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with steam or clean water modified with an approved corrosion inhibitor immediately after abrasive blasting to remove corrosion products and residual chlorides from pits and imperfections within its surface. Reinforcement which is badly corroded or missing, may require replacement. Contractor is to notify the Architect in writing immediately if this condition occurs.

3. Concrete surface preparation will be performed in strict accordance with the manufacturer's instructions. The surface must be mechanically prepared to provide a fractured aggregate profile of +/- 1/16". Areas to be repaired must be clean, sound and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means approved by the Architect/Engineer. Continue removal of concrete at cracked areas down to solid substrate to a maximum 10 mil width of crack. Be sure the repair area is not less than 1/4" in depth, 1" depth minimum for the Sikacrete 211 SCC Plus. Concrete substrate must be structurally sound. Saw cut or cut back the extremities of the repair locations to a depth of at least 3/8" (10mm) to avoid feather edging and to provide a square edge. Roughen the saw cut edge of the repair to provide a rough, open textured surface.

4. Any remaining small cracks (10 mils max.) in the substrate in the area of the patching work must be treated with appropriate Sika filler product.

B. Priming of Reinforcing Steel with **Sika Armatec 110 Epocem**:

1. Mixing and application of the anti-corrosion coating for the reinforcement steel: Shake contents of components “A and B”. Empty the appropriate amount into a clean mixing container. Mix thoroughly for 30 seconds with a low speed drill and a jiffy mixing paddle. Slowly add the appropriate amount of component “C” while continuing to mix for three minutes until uniform with no lumps.

2. Apply one full coat of Sika Armatec 110 Epocem at 20 mils thick and allow it to dry approximately 2 hours before continuing. Apply a second coat at 20 mils thick.

C. Application of **SikaRepair SHA with Latex R** repair mortar:

1. Mixing and application of the vertical and overhead repair mortar: Mix a minimum of ¾ of a gallon of Latex R with one bag of SikaRepair SHA repair mortar in a clean dry mixing container, using a heavy duty, low speed drill (400-600 rpm), and appropriate mixing paddle, until uniform consistency, a maximum of three minutes. Do not exceed 1 gallon per bag.

2. The substrate should be saturated surface dry with no standing water.

3. Apply a scrub coat of the mixed material with a stiff bristle brush. While the scrub coat is still wet place the SikaRepair SHA repair mortar. For applications greater than 1 ½” in depth overhead, apply the material in lifts. Score the top surface of each lift to produce a roughened surface for the next lift. Allow the preceding lift to set prior to continuing. Repeat step 3.

4. Extend all existing control and expansion joints through any patch. Provide backer rod & sealant. Install new joints as recommended by the manufacturer and/or directed by the Architect.

D. Application of **Sikacrete 211 SCC Plus** form and pour material:

1. Place 5½ pints of clean water in a mixing container. Slowly add Sikacrete 211 SCC Plus while continuing to mix using a heavy duty, low speed drill (400-600 rpm), and a jiffy style mixing paddle, until uniform consistency, a maximum of three minutes. An additional ½ pint of water can be added if needed. Mix to a uniform consistency, maximum 3 minutes.

2. The substrate should be saturated surface dry with no standing water.

3. Pour the material into the forms and vibrate.

4. Extend all existing control and expansion joints through any patch. Provide backer rod & sealant. Install new joints as recommended by the manufacturer and/or directed by the Architect.

E. Application of **SikaQuick 1000** horizontal repair mortar:

1. Mix 4.5 pints of clean potable water with SikaQuick 1000 repair mortar in a clean dry mixing container, using a heavy duty, low speed drill (400-600 rpm), and a jiffy style mixing paddle until uniform consistency, a maximum of three minutes. Add up to another ½ pint of additional water to achieve the desired consistency.

2. For applications greater than one inch in depth add 25-30 pounds of clean, course, well graded, saturated surface dry, non reactive 3/8" pea gravel aggregate to one mixed unit of SikaQuick 1000.

3. Saturate the concrete with clean water. The surface should be saturated surface dry with no standing water.

4. Apply a slurry coat to the surface. While the slurry is still wet, apply the repair mortar.

5. Extend all existing control and expansion joints through any patch. Provide backer rod & sealant. Install new joints as recommended by the manufacturer and/or directed by the Architect.

F. All products mentioned in this section must be applied in strict accordance with the manufacturer's instructions. Carefully observe mixing, application and curing recommendations for each product.

G. Finishing:

1. SikaRepair SHA with Latex R and SikaQuick 1000 are finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats or damp sponges may be used to achieve the desired surface texture. The completed surfaces should not be overworked.

3.02 STORAGE AND CONDITIONS

A. Low Temperature Conditions:

1. In cold conditions down to 45°F (7°C), maintaining the Latex R Liquid at 65°F-75°F is advisable to accelerate strength development. Normal precautions for winter working with cementitious materials should then be adopted. The material should not be applied when the substrate and/or air temperature is 45°F (7°C) and falling. At 45°F (7°C) static temperature or at 45°F (7°C) and rising, the application may proceed. Do not apply if the temperature is expected to fall below 32°F within 72 hours of application.

B. High Temperature Conditions:

1. At ambient temperatures above 80°F (26°C), the materials should be conditioned to 65°F-75°F. Do not apply above 95°F.

3.03 CURING

A. All repair materials mentioned in this section are cement-based repair mortars. Under optimum conditions, curing may not be required. However, for purposes of bidding, these materials shall be cured immediately after finishing in accordance with good concrete practice (ACI308) to approach peak performance of the repair. Proper curing is of particular importance when ambient conditions (high temperatures, low humidity, moderate to high winds) may cause rapid moisture loss. The use of Sikagard Curing compound, sprayed onto the surface of the finished repairs in a continuous film, is recommended. Large areas should be cured as troweling progresses, 5 sq. ft. (0.47 sq. mtrs.) at a time without waiting for completion of the entire area. Other curing options include a fine mist of water; application of wet burlap; application of polyethylene sheeting taped down at the edges; or a combination of the above. In cold conditions, the finished repair must be protected from freezing. If doubts arise concerning the proper curing procedures, consult Sika Corporation's technical services department.

B. Clean Up:

1. Sika Armatec 110 Epocem, SikaRepair SHA, Sikacrete 211 SCC Plus, and SikaQuick 1000 should be removed from tools, equipment, and mixers with clean water immediately after use. Cured material can only be removed mechanically.

2. Clean hands and skin immediately with soap and water or industrial hand cleaner. Do not use solvents.

3.04 LIMITATIONS

A. All products mentioned in this section should not be used when the temperature is below 45°F (7°C) and falling. Neither should they be exposed to rain or moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour. If any doubts arise concerning temperature or substrate conditions, consult Sika Corporation's technical services department. Refer to the respective technical data sheets for the products mentioned in this section for further limitations.

3.05 PACKAGING AND YIELD

A. Estimating:

1. Supply:

a. Sika Armatec 110 Epocem: 1.65 gallon unit (22.7 fl. oz. A + 57.6 fl. oz. B + 4 bags of component C @ 5.5 lbs each.
b. Sika Repair SHA with Latex R: 50 lb. bag + 5 gallon pail
c. Sikacrete 211 SCC Plus: 65 lb. bag
d. SikaQuick 1000: 50 lb. bag

2. Coverage and Yield:

a. Sika Armatec 110 Epocem: 40 square feet per gallon
b. SikaRepair SHA with Latex R: .55 cubic feet per bag
c. Sikacrete 211 SCC Plus: 0.50 cubic feet per bag
d. SikaQuick 1000: .43 cubic feet per bag neat, .65 cubic feet per bag extended with 25 pounds of 3/8" pea gravel.

3. Notes: Due to waste factors and the variety and nature of possible substrates, practical coverage figures will vary.

3.06 STORAGE

A. Product has a shelf life of 12 months if kept in recommended storage conditions in the original, unopened containers.

B. Storage Conditions: Store in cool, dry conditions in the original unopened bags or cans. If stored at high temperatures and/or high humidity conditions, the shelf life may be reduced 4 to 6 months. Sika Latex R should be protected from freezing.

C. Health and Safety: Avoid breathing dust and avoid contact with skin. Rubber gloves and/or barrier creams, protective clothing, and goggles should be worn. Provide sufficient mechanical and/or local exhaust ventilation to maintain a low level of dust exposure. If ventilation is not provided, a NIOSH/MESA respirator should be worn.

D. Disposal: In case of spillage, absorb liquid and clean up powder by use of dustless method and

dispose of in accordance with applicable local, state, and federal regulations.

E. Special Precautions: Since emptied containers retain product residues (vapor, liquid, and/or solid), caution should still be exercised in their handling. Keep out of reach of children. For industrial use only. Not for internal consumption. Prior to use, consult MSDS and read proper handling instructions and warnings as noted on the product packaging.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 030130.61 – INTERIOR HORIZONTAL CONCRETE RESURFACING (Topping)

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this Section of the Specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this Section and other related work in connection with interior horizontal concrete resurfacing (topping) as shown on the drawings and/or specified herein.

1. This specification does not cover vertical or overhead repair.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

1. Submit manufacturer's product data, specifications, installation instructions, MSDS, and samples for each component.

2. Submit two (2) copies of the manufacturer's guarantee agreeing to replace resurfacing materials in the event of failure in materials or workmanship for five (5) years from within 12 months of date of acceptance.

1.04 QUALITY ASSURANCE

A. A representative of the manufacturer of the protective coating, other than the contractor, must be present at the site during the initial application of the protective coating and periodically thereafter, at intervals to be approved by the Architect.

B. Upon completion of this work, the Contractor shall secure a letter of certification from the manufacturer that all work has been done to the product manufacturer's satisfaction. This letter of certification must be filed with the Architect before final acceptance.

C. Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. All workmen involved in the application of the coating shall have received training by the manufacturer.

PART 2 - MATERIALS

2.01 MANUFACTURER

A. Design is based on use of products as manufactured by Sika Corporation, and the terminology used may include reference to that manufacturer's proprietary products. Such reference shall be construed only as establishing the quality of materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

1. Products:

    a. "Sikadur 43 Patch-Pak" three component, abrasion resistant epoxy repair mortar.

2.02 PRODUCT DATA

A. Epoxy resin adhesive binder:

1. Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.

2. Component B shall be primarily a reaction product of a selected amine blend with epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents.

3. Component C shall be a blend of silica sands and pigments.

B. The material shall be supplied in factory proportioned kits, and shall not contain asbestos.

2.03 PROPERTIES

A. Working life: 35 to 50 minutes.

B. Traffic time to light foot: 2.5 to 4 hours.

C. Consistency: trowel grade mortar.

D. Color: concrete gray.

E. Properties of the cured epoxy resin mortar kit:

1. Compressive properties (ASTM D695):

    a. Compressive strength at 8 hours: 3,600 psi
    b. Compressive strength at 28 days: 13,800 psi

2. Tensile Properties (ASTM D638) at 14 days:

    a. Tensile strength: 2,100 psi
    b. Elongation at break: 0.7%
    c. Modulus of elasticity: 970,000

3. Flexural properties (ASTM D790) at 14 days:

    a. Flexural strength (Modulus of Rupture): 3,500 psi
    b. Tangent modulus of elasticity in bending: 1,600,000 psi

4. Shear strength (ASTM D732) at 14 days: 4,100 psi

5. The epoxy resin mortar kit shall be approved by the USDA.

PART 3 - EXECUTION

3.01 APPLICATION INSTRUCTIONS

A. Surface Preparation:

1. Clean the surface by removing any dust, unsound or contaminated material, plaster, oil, paint, greases, corrosion deposits, or algae. Where breaking out is not required, roughen the surface and remove any laitance by light scabbling or sandblasting. Oil and grease deposits should be removed by steam cleaning, detergent scrubbing, or the use of a degreaser.

2. Concrete slab substrate must be structurally sound. Loose and unsound concrete should be hammered out. Mechanically prepare surface and expose aggregate to a minimum surface profile of 1/16" (CSP-4).

3. Where reinforcing steel with active corrosion is encountered, steel must be sandblasted to a white metal finish.

B. Mixing:

1. Sikadur 43 Patch-Pak is supplied in factory pre-measured kits. To mix; pour entire contents of component "A" and component "B" into a clean pail. Mix thoroughly with a slow speed drill fitted with a jiffy mixer for approximately 3 minutes until a uniform color and gel-like consistency has been reached. Remove approximately 18 ounces for priming. Slowly add component "C" aggregate into pre-mixed gel, continuing to mix for an additional 3 minutes until consistency is uniform.

C. Application:

1. Using a brush, prime the prepared area with epoxy held aside for priming.

2. While primer is still tacky, apply the epoxy mortar mixture starting at the edges and working towards the middle. Apply the epoxy mortar in lifts no greater than 1½". Screed the area level and finish using a clean trowel.

3. Sikadur 43 Patch-Pak EL should be applied only when the material temperature, substrate temperature, and the ambient temperature is above 40°F and rising.

D. Clean Up:

1. Clean equipment with approved solvent.

2. Cured product can only be removed mechanically.

3.02 LIMITATIONS

A. Temperature: Minimum ambient, surface, and material temperature should be 40°F and rising at time of application.

3.03 PACKAGING AND YIELD

A. The 70 lb. Sikadur 43 Patch-Pak contains 200.4 fluid ounces of epoxy resin (component "A" and component "B") in a 3-gallon can; 52 lbs. of aggregate (component "C") in a multi-wall bag.

B. One kit yields approximately 0.5 cubic feet of epoxy mortar. Note: The actual yield per unit of Sikadur 43 Patch-Pak will depend on the consistency used. Due to waste factors and the variety and nature of possible substrates, practical coverage figures may be reduced.

3.04 STORAGE

A. Product has shelf life of 24 mos. at 73°F when stored in dry place.

B. Storage Conditions: Store in cool, dry conditions in the original unopened bags or cans.

C. Health and Safety: Avoid breathing dust and avoid contact with skin. Rubber gloves and/or barrier creams, protective clothing, and goggles should be worn. Provide sufficient mechanical and/or local exhaust ventilation to maintain a low level of dust exposure. If ventilation is not provided, a NIOSH/MESA respirator should be worn.

D. Disposal: In case of spillage, absorb liquid and clean up powder by use of dustless method and dispose of in accordance with applicable local, state, and federal regulations.

E. Special Precautions: Since emptied containers retain product residues (vapor, liquid, and/or solid), caution should still be exercised in their handling. Keep out of reach of children. For industrial use only. Not for internal consumption. Prior to use, consult MSDS and read proper handling instructions and warnings as noted on the product packaging.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 033000 – CAST-IN-PLACE CONCRETE WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 SCOPE/SUMMARY

A. In general, the extent of concrete work is shown on the drawings. Provide all labor, materials, equipment, services, and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein, including, but not necessarily limited to, the following:

1. Concrete footings, pile caps, grade beams, foundations, and walls.
2. Concrete steps, platforms, ramps, equipment pads.
3. Interior concrete slabs on grade or fill and elevated slabs.
4. Exterior concrete on grade: Curbs, walks, plazas, stairs, ramps and driveway aprons.
5. Expansion, control and isolation joints in concrete work.
6. Porous fill and vapor barrier for slabs on grade or fill.
7. Floor hardening treatment for interior exposed cement floors and base.
8. Grouting of bearing plates, leveling plates, miscellaneous lintels, and equipment supported on concrete.
9. All forms and reinforcing required for work of this section.
10. Cut, patch, finish, and point concrete and cement work.
11. Pre-molded filler at intersection of floor slabs and exterior wall, and where otherwise indicated (typical at all points abutting vertical surfaces).
12. Installation of water stop material where indicated when necessary.

B. Work not included: The following items of related work are specified in other sections or contracts.

1. Furnishing of hanger inserts, anchors, leveling plates, sleeves, conduits, etc.
2. Waterproofing and damp proofing.

1.03 RELATED SECTIONS

A. Section 013563 – LEED Requirements
B. Section 014523 – Tests, Inspections and Special Inspections
C. Section 014529 – Testing Laboratory Service
D. Section 017419 – Construction Waste Management
E. Section 035416 – Self Leveling Cementitious Underlayment
F. Section 042000 – Unit Masonry
G. Section 051200 – Structural Steel
H. Section 061000 – Rough Carpentry
I. Section 071000 – Damproofing
J. Section 071616 – Crystalline Waterproofing
K. Section 072000 – Building Insulation
L. Section 072600 – Vapor Retarders
M. Section 310000 – Earthwork
N. Section 310002 – Stakeout

1.04 SUBMISSIONS

A. All submissions to be made in accordance with Section 013300 - Submittal Procedures.

B. A concrete mix design: Submit laboratory test reports of concrete materials and mix design for each strength of concrete required on the project. Design data shall clearly identify the testing laboratory and provide 28 day strength testing reports representing mix proposed inclusive of all admixtures.

1. Mix design shall also include the following information;

a. Minimum design strength intended.
b. Cement content
c. Water content
d. Slag content
e. Water cement ratio
f. Maximum aggregate size
g. Coarse aggregate content
h. Fine aggregate content
i. Air entrainment by volume
j. Adjustment for aggregate moisture slump
k. Tested flexural strength
l. Tested compressive strength

2. Additional inclusions if required on job:

a. Admixtures
b. Water reducers
c. Accelerators
d. Retarders
e. Fibers
f. Colorants
g. Special purpose admixtures
h. Corrosion inhibitor
i. Viscosity modifiers

C. Product Data: Submit manufacturer's product data for all materials and items required for the proposed Scope of Work. Including, but not limited to: concrete mix components, reinforcement and forming accessories, wall sleeves, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, hardener/sealers, vapor barriers, non-shrink grit, etc. Product data for materials and items not listed above will be submitted upon the request of the Architect.

D. Shop Drawings-Reinforcement: Submit complete and accurate shop drawings for approval before any work is executed. The shop drawings submitted by the Contractor shall be independently prepared for him by a Professional Engineer licensed to practice in the State of New York or otherwise within the state where the project is to be constructed and shall completely show the following:

1. Foundation plans and details, including but not limited to: pier plan details, stair sections, exterior wall elevation drawings which show all reinforcing, top of wall elevations, brick shelves & shelf elevations, tops of piers, bottom of footings, stepped footings and elevation changes, bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

2. Floor slab plan indicating elevation variations, recesses, control joints, isolation joints, expansion joints and any proposed cold joints and details of each.

3. Bending and tying diagrams, including typical corners,

4. Sizes and spacing of members, relationship to contiguous work, fabrication, bending, and placement of concrete reinforcement.

5. General notes and legends as required.

6. Drawings shall comply with the latest version of ACI 315 Details and Detailing of Concrete Reinforcement.

7. Any and all other pertinent information.

8. Shop drawings must be signed and sealed by licensed professional engineer.

E. Samples: Submit samples of materials only if requested by the Architect, including names, sources, and descriptions.

F. Material Certificates: Provide material certificates in lieu of laboratory test reports when permitted by Architect. Material certificates shall be signed by the NYS-licensed Professional Engineer who prepared the shop drawing submittal, certifying that each material item complies with, or exceeds, specified requirements.

G. LEED Submittals, for LEED projects submit the following:

1. Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 - LEED Requirements.

2. Credit MR 7: If plywood forms are used, Contractor must submit documentation that the plywood used contains no urea-formaldehyde and that the plywood meets the requirements of LEED MR Credit 7, Certified Wood, by providing wood certification documentation, including chain-of-custody documentation from the manufacturer declaring conformance with the Forest Stewardship Council (FSC) guidelines for certified wood building components.

3. Manufacturer’s verification that steel reinforcement contains at least 90% combined post-consumer and post-industrial recycled content.

4. Manufacturer’s verification that VOC content of interior concrete sealer is less than 250 g/L.

1.05 GENERAL REQUIREMENTS AND QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the latest version of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

2. American Society for Testing and Materials (ASTM) Latest Versions:

a. ASTM C 33 - Specification for Concrete Aggregates
b. ASTM C 39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens
c. ASTM C 42 - Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
d. ASTM C 94/C94 M-00 - Standard Specification for Ready-Mix Concrete
e. ASTM C 150 - Specification for Portland Cement
f. ASTM A 185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
g. ASTM C 260 - Specification for Air-Entraining Admixtures for Concrete

h. ASTM C 309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete
i. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete
j. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
k. ASTM A 775 - Epoxy Coated Reinforcing Steel Bars
l. ASTM F 710-11 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

3. American Concrete Institute (ACI): Latest Versions

a. ACI 117 - Standard Tolerances for Concrete Construction and Materials
b. ACI 211 - Recommended Practice for Selecting Proportions Concrete
c. ACI 301 - Specifications for Structural Concrete for Buildings
d. ACI 302 - Guide for Concrete Floor and Slab Construction
e. ACI 302.1 - Guide for Concrete Floor and Slab Construction
f. ACI 302.2 - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
g. ACI 304 - Recommended Practice for Measuring, Mixing and Placing Concrete
h. ACI 305 - Guide to Hot Weather Concreting
i. ACI 306 - Guide to Cold Weather Concreting
j. ACI 308 - Standard Specification for Curing Concrete
k. ACI 315 - Details and Detailing of Concrete Reinforcement
l. ACI 318 - Building Code Requirements for Reinforced Concrete
m. ACI 347 - Recommended Practice for Concrete Formwork
n. ACI 360R-10 - Guide to Design of Slabs on Grade

B. Quality Control Testing During Construction:

1. The Owner will employ an independent testing laboratory to perform tests and to submit test reports. The contractor will be responsible for contacting the testing laboratory to arrange for all sampling, observation and testing. The Owner will pay for all passing tests; all failed tests and any additional testing required due to failed tests will be the responsibility of the contractor.

2. Sampling and testing for quality control during placement of concrete shall include the following as appropriate to scope, as directed by the Architect and in coordination with Section 014523.

3. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

a. Slump: ASTM C 143; one test at point of discharge per truckload or batch of each type of concrete; additional tests when concrete consistency seems to have changed. See 2.05G for slump limits.

b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each days' placement of each type of air-entrained concrete.

c. Concrete Temperature: Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens are made.

d. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

e. Compressive Strength Tests: ASTM C 39; one set for each day's placement exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of

each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

1) When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than five are used.

f. When total quantity of a given class of concrete is less than 50 cubic yards, strength test may be waived by Architect if, in his judgement, adequate evidence of satisfactory strength is provided.

g. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

h. At the discretion of the Architect the strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

4. Test results will be reported in writing to the Architect, Structural Engineer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions, and materials, compressive breaking strength and type of break for both 7-day tests and 28-day tests.

5. Non-destructive Testing: Impact hammer, sonoscope, or other non-destructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

6. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

C. The Contractor shall provide a storage box to be used exclusively for the storage and curing of concrete test specimens. This box shall be substantially constructed, made of 1" thick T & G lumber, well braced to prevent warping, or 1/2" thick plywood (exterior grade) may be used. Box shall be provided with a hinged cover and padlock. Storage box shall be so constructed and located on the project site that its air temperature when containing concrete specimens will remain between 60° and 80°F. During the first 24 hours that any test specimens are in the box, electric heating cables or other approved means shall be provided to maintain this temperature during freezing weather. The storage box shall be placed on the site where approved, in location such that it will not be subject to any vibration or disturbance. Storage box shall not be placed in any building or shanty while it is being used for storing specimens.

D. Should the average strength of the test cylinders fall below the required strength, the Architect may require changes in the proportion to apply to the remainder of the work or may require load tests and/or cores at the Contractor's expense on the portion of the structure which fails to develop the required strength or may require additional curing, the load test shall conform to the requirements of the Building Code Requirements for Reinforced Concrete (ACI 318, latest edition). If the concrete does not meet the specified requirements, the Architect may condemn such concrete already in place and the Contractor, at his own expense, shall remove such condemned concrete and replace same with new concrete to the satisfaction of the Architect. Use of high early strength cement will not be permitted without written approval of the Architect.

1.06 PROJECT CONDITIONS

A. General: The contractor shall ensure that all proper project conditions are in place, ready for the setting of forms, reinforcement and subsequent concrete pouring, prior to the commencement of the work. Commencement of work constitutes contractor acceptance of all existing conditions.

1.07 CONTROLLED CONCRETE

A. Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, and water or as otherwise composed via approved mix design.

   1. Additional materials may include: slag, admixtures, fibers, colorants, or special purpose admixtures.

B. All concrete, unless otherwise specified or called for on the drawings, shall be controlled concrete as defined and regulated in the local building code and by the American Concrete Institute and its **ultimate compressive strength at the end of 28 days shall be not less than 4,000 pounds per square inch for foundations, walls and footings, 4,500 pounds per square inch for slabs-on-ground elevated slabs, and other building concrete, and 4,500 pounds per square inch for exterior concrete including, but not limited to, sidewalks, stairs, ramps, driveway aprons and curbing, unless otherwise indicated on structural drawings.**

C. Before the work is begun, the Contractor shall have preliminary trial tests made by a laboratory approved by the Architect to determine the mixture required to give the strength specified. Concrete shall be designed in accordance with the A.C.I. *Standard Recommended Practice for Selecting Proportions for Concrete* (ACI-513) to produce the strength required. Concrete shall be so designed that the concrete materials will not segregate nor shall excessive bleeding occur. Tests shall be made in accordance with ASTM C-39. The laboratory trial mixture for each mix design shall develop a concrete of compressive strength at 28 days of 1,200 psi higher than the required minimum for each of the strengths indicated to be acceptable for use in the field, but in no case shall cement content be less than 6 bags per cubic yard for 4,000 psi and 6 1/2 bags for 4,500 psi concrete. The proposed mixture must be approved by the Architect before the Contractor proceeds with the work.

D. Upon approval by the Architect, the Contractor will be allowed to proceed with the work if the laboratory trial mixture develops a compressive strength of 70% of the required ultimate strength at the end of seven (7) days.

E. If, during the progress of the work, it is found that the required workability and strength cannot be attained with the materials furnished by the Contractor, the Architect may order such changes in proportions or materials or both as may be necessary to secure the desired properties.

F. The proportions of aggregate to cement shall be such as to produce a mixture which will work readily into the corners and around reinforcement but without permitting the materials to segregate or excess free water to collect on the surfaces. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve (fine aggregate) shall be not less than 40% or greater than 50% of the total, unless otherwise directed. Maximum size of coarse aggregate in slab, beams, and columns shall be 3/4" and in walls and footings 1 1/2".

G. The source of supply of the aggregate shall not change during the course of the job without previous notice to the Architect, and the materials from any new source shall be subject to acceptance or rejection based upon tests to be made by the Testing Laboratory at the Contractor's expense.

1.08 DELIVERY, STORAGE AND HANDLING

A. ASTM C 94/C 94M, Article 14 - Batch Ticket Information: In addition to the information required by Paragraph 14.1, also include the following:

1. Type and brand, and amount of cement.
2. 2. Weights of fine and coarse aggregates.
3. 3. Class and brand, and amount of fly ash (if any).

B. Epoxy-Coated Bar Reinforcement: Deliver, store and handle reinforcement in accordance with fabricator's recommendations and as specified.

1. Use padded or nylon bundling bands.
2. Lift and hoist bundles of bars with nylon or padded wire rope slings at the third points or use spreader bars.
3. Store bars on wood or padded cribbing.
4. Do not drop bars, and do not drag bars over the ground or over other bars.

C. Protect materials delivered from the elements and from otherwise being damaged on site.

D. Any materials damaged on site due to improper delivery, storage or handling shall not be incorporated in the project and shall be replaced at no cost to the Owner.

E. Deliver, store and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.

1. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars: All reinforcing steel shall conform to ASTM A615, Grade 60, deformed (60 KSI yield stress) and be rolled from intermediate grade new steel billets.

B. Epoxy Coating: Conform fusion bonded epoxy coated reinforcing steel bars to ASTM A775 when used. Furnish acceptance test reports for each lot of epoxy-coated bars delivered to the site. Leave

portions of the reinforcing steel bars uncoated where mechanical connections are shown. Bars shall be cut and bent cold before applying coating material.

C. Welded Wire Fabric: All reinforcement mesh shall be electric-welded wire fabric with an ultimate tensile strength of not less than 55,000 pounds per square inch. All reinforcement mesh shall conform to ASTM A-185. Epoxy-Coated Fabric Reinforcement shall conform to ASTM A 884, Class A.

D. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications (brick is not acceptable other than for slabs on ground).

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Precast concrete bricks are acceptable for slab on ground construction.

2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

3. Certified copies of mill reports shall accompany all deliveries of reinforcing steel, identified to indicate the minimum yield strength of the furnished bars.

4. Copies of the manufacturer's affidavit shall accompany all deliveries of welded wire fabric certifying its minimum tensile strength.

E. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

F. Bar Supports for Epoxy-Coated Bar Reinforcement: Bar supports made of dielectric material compatible with concrete, or wire bar supports coated with dielectric material compatible with concrete for a minimum distance of 2 inches from the point of contact with the reinforcing bar. Reinforcing bars used as support bars and spreader bars shall be epoxy-coated.

G. Tie Wire for Epoxy-Coated Reinforcement: Wire coated with nylon, plastic or epoxy.

H. For LEED projects all steel reinforcement to contain minimum 90% combined post-consumer and post-industrial recycled content.

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout the project, unless otherwise acceptable to the Architect.

B. For LEED projects Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

1. Provide no more than 25% within the mix for use on exposed slabs on grade, elevated slabs, sidewalks, ramps and stairs.

2. Provide no more than 40% within the mix for use on foundation walls, grade beams, piers, footings, etc.

C. Normal Weight Aggregates: ASTM C33, and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

2. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

3. Coarse aggregates for all stone concrete and fine aggregate shall conform to ASTM Designation C33 - well graded from fine to coarse with the specified limits. The maximum size of the aggregate 3/4" in slabs, beams and columns and 1-1/2" in walls and footings and not larger than one-fifth (1/5) of the narrowest dimension between the sides of the forms of the member for which the concrete is to be used, not larger than three-fourths (3/4) of the minimum clear spacing between reinforcing bars.

4. Coarse aggregate for stone concrete shall consist of crushed stone or natural or crushed gravel, having clean, hard, strong, uncoated particles free from injurious amounts of soft, thin, elongated, or laminated pieces, alkali, organic, or other deleterious matter.

5. Fine aggregate for stone concrete - sand, stone screenings, or other inert material with similar characteristics having clean, strong, durable, uncoated grains, and free from lumps, salt, or flaky particles, clay, shale, alkali, organic matter, or other deleterious substance.

6. Aggregates shall be graded as follows:

Coarse Aggregate	Percent Retained
1" sieve	0
3/4" sieve	0 - 10
3/8" sieve	45 - 80
No. 4 sieve	90 – 100

Fine Aggregates	By Weight Passing
Passing 1/4" square opening	100%
Passing No. 4 sieve	95 - 100%
Passing No. 16 sieve	50 - 85%
Passing No. 50 sieve	15 - 25%
Passing No. 100 sieve	2 - 8%

D. Anti-shrinkage grout to be used for grouting in of bearing plates, anchors, and inserts shall be Master Builders *"Embecco"* premix or approved equal.

E. Admixtures shall be used only with the prior written approval of the Architect. All mixtures specified herein or proposed for use by the Contractor shall be of a manufacturer as approved by the Architect and used strictly in accordance with the manufacturer's directions.

1. A set-controlling, water-reducing admixture: *"Pozzolith"* manufactured by Master Builders or approved equal.

2. Air-entraining Admixture: ASTM C-260, certified by manufacturer to be compatible with other required admixtures.

a. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1) "Air-Mix"; Euclid Chemical Company.

2) "Sika Aer"; Sika Corporation.
3) "MB-VR or MB-AE"; Master Builders.
4) "Darex AEA" or "Daravair"; W.R. Grace.
5) "Edoco 2001 or 2002"; Edoco Technical Products.
6) "Air-Tite"; Gifford Hill/American Admixtures.

b. Air-entraining admixtures shall be used for all concrete exposed to weather.

F. Water: Water used in mixing concrete shall be clean, potable (drinkable), and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious materials. (complying with ASTM C94).

2.04 RELATED MATERIALS

A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

1. Polyethylene sheet not less than 8 mils thick.

B. Non-shrink Grout: CRD-C 621, factory pre-mixed grout.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

a. Non-metallic:

1) "Set Grout"; Master Builders.
2) "Sonogrout"; Sonneborn-Rexnord.
3) "Euco-NS"; Euclid Chemical Company.
4) "Supreme"; Gifford-Hill/American Admixtures.
5) "Crystex"; L & M Construction Chemical Company.
6) "Sure-Grip Grout"; Dayton Superior Corporation.
7) "Horngrout"; A.C. Horn, Inc.
8) "Five Star Grout"; U.S. Grout Corporation.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per square yard, complying with AASHTO M 182, Class 2.

1. For LEED projects Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

a. Provide no more than 25% within the mix for use on exposed slabs on grade, elevated slabs, sidewalks, ramps and stairs.

b. Provide no more than 40% within the mix for use on foundation walls, grade beams, piers, footings, etc.

D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

E. Liquid Membrane-Forming Curing Compound: Concrete slabs shall be cured by means of

pigmented curing compound of a type not affecting adhesion of resilient flooring or other surface finish, of approved manufacture, conforming to ASTM C-309, and applied in strict accordance with manufacturer's directions. Liquid type membrane-forming curing compound complying with ASTM C 309, Type 1, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

1. Available Products: Subject to compliance with requirements, products, which may be incorporated in the work include, but are not limited to, the following:

    1) "Masterseal"; Master Builders.
    2) "A-H 3 Way Sealer"; Anti-Hydro Waterproofing Company.
    3) "Ecocure"; Euclid Chemical Company.
    4) "Clear Seal"; A.C. Horn, Inc.
    5) "Sealco 309"; Gifford-Hill/American Admixtures.
    6) "J-20 Acrylic Cure"; Dayton Superior.
    7) "Spartan-Cote"; The Burke Company.
    8) "Sealkure"; Toch Div. - Carboline.
    9) "Kure-N-Seal"; Sonneborn-Rexnord.
    10) "Polyclear"; Upco Chemical/USM Corp.
    11) "L & M Cure"; L & M Construction Chemicals.
    12) "Klearseal"; Setcon Industries.
    13) "LR-152"; Protex Industries.
    14) "Hardtop"; Gifford-Hill.

2. Liquid membrane curing compounds may only be used on slabs where there is no other finish flooring material to be installed.

F. Bonding Compound: Polyvinyl acetate or acrylic base.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

    a. Polyvinyl Acetate (Interior Only):

        1) "Eucoweld"; Euclid Chemical Company.
        2) "Weldcrete"; Larsen Products Corporation.

    b. Acrylic or Styrene Butadiene:

        1) "J-40 Adbond Bonding Agent"; Dayton Superior Corp.
        2) "Everbond"; L & M Construction Chemicals.
        3) "Hornweld"; A.C. Horn, Inc.
        4) "Sonocrete"; Sonneborn-Rexnord.
        5) "Acrylic Bondcrete"; The Burke Company.
        6) "SBR Latex"; Euclid Chemical Company.
        7) "Daraweld C"; W.R. Grace.

G. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," or "Class" to suit project requirements.

2. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

    a. *"Thiopoxy"*; W.R. Grace.
    b. *"Epoxtite"*; A.C. Horn, Inc.
    c. *"Edoco 2118 Epoxy Adhesive"*; Edoco Technical Products.

d. *"Sikadur Hi-Mod"*; Sika Chemical Corporation.
e. *"Euco Epoxy 452 or 620"*; Euclid Chemical Company.
f. *"Patch and Bond Epoxy"*; The Burke Company.
g. *"Concresive 1001"*; Adhesive Engineering Company.

H. Joint Fillers / Filler Strips: Joints for slabs on ground shall be formed with preformed, non-exuding bituminous fiber expansion filler, which shall extend full length and depth of slabs. Vertical expansion joints shall be constructed complete with water dams or waterstops and joint filler.

I. Vapor Barriers: Under typical interior slabs where finished flooring does not involve wood, provide non-woven, polyester, reinforced, polyethylene coated sheet of 15 mil thickness.

1. Vapor barrier membrane must have the following properties:

a. Permeance as tested after mandatory conditioning (ASTM E 1745 paragraphs 7.1.2-5): less than 0.01 perms (gran/ft^2/hr/in-Hg).

b. Other performance criteria:

1) Strength: Class A (ASTM E 1745).
2) Minimum thickness of plastic retarder material: 15 mils.

c. Basis of Design: Stego Wrap 15-mil Vapor barrier by Stego Industries, LLC.

d. Or Architect approved equal.

J. Vapor barrier under interior slabs where finished flooring involves wood assemblies such as gymnasium and stages provide bituminous vaporproofing/waterproofing membrane.

1. Vapor barrier must have seven-ply, weather-coated, permanently bonded, semi-flexible bituminous core board composed of a 3-ply plasmatic matrix sealed between liners of asphalt-impregnated felt and a glass mat liner. Vapor barrier shall consist of an asphalt weather coat and covered with a polyethylene anti-stick sheet. Vapor barrier shall meet or exceed all requirements of ASTM E 1993-98 and shall have the following characteristics:

a. Minimum permeance ASTM F1429, calibrated to ASTM E96, Water Method: 0.0011 Perms.

b. Tensile Strength ASTM E154, Section 9: 156 LBS. force.

c. Puncture Resistance ASTM E154: 149 LBS. force/inch.

d. Pre-molded Membrane® Vapor Seal with Plasmatic Core by W.R. Meadows, W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338. (800) 348-5976. (847) 683-4500. Fax (847) 683-4544. Website: www.wremeadows.com.

K. Water Stops: Provide all waterstops similar to or equal to those as produced by *Greenstreak, Inc.,* as required by the drawings, either embedded in concrete, or across and/or along the joint, to form a watertight diaphragm that prevents the passage of fluid through the joint.

L. All other materials as hereinafter specified. All set-in-place concrete elements (i.e. – pre-fabricated water stops, cast aluminum nosings, exterior stair components, etc.) shall be installed in conformance with their associated specification sections, and/or manufacturer's installation instructions if no specification is provided and in complete coordination with the work of this Section.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Design mix of all concrete shall provide the following properties, as indicated on the drawings and schedules:

1. 4,000 psi 28-day compressive strength; W/C ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained).

2. 4,500 psi 28-day compressive strength; W/C ratio, 0.67 maximum (non-air-entrained), 0.54 maximum (air-entrained).

3. Do not air entrain concrete for trowel finished interior floors and suspended slabs, including polished concrete floors. Do not allow entrapped air content to exceed 3 percent.

B. Stone concrete shall weigh approximately 144 pounds per cubic foot. Exterior concrete, exposed to weather, shall have a water cement ratio not to exceed 6 1/2 gallons per sack of cement and an air entraining agent approved by the Architect to be added to obtain concrete with an air content not less than 4% nor more than 6% conforming to ASTM C-175, latest edition.

C. Prepare design mixes for each type and strength of concrete laboratory trial batch methods as specified in ACI 301. Use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

D. Submit written reports to Architect and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and accepted by the Architect.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect before using in work.

F. Admixtures: ONLY TO BE USED WITH PRIOR WRITTEN APPROVAL OF THE ARCHITECT!

1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.

2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).

3. Use high-range water-reducing admixture in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

4. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

a. Concrete structures and slabs exposed to freezing and thawing, de-icer chemicals, or subjected to hydraulic pressure.

b. 4.5 percent (moderate exposure).
5.5 percent (severe exposure) 1-1/2" maximum aggregate.

c. 4.5 percent (moderate exposure)
6.0 percent (severe exposure) 1" maximum aggregate.

5. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3".

2. Reinforced foundation systems: Not less than 1" and not more than 3".

3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.

4. Other concrete: Not less than 1" and not more than 4".

2.06 MIXING

A. All concrete shall be machine mixed or transit mixed.

B. Hand mixing will not be permitted unless approved by the Architect. Mixing shall conform to ASTM C-94 and ACI-304. On-site mixing will not be permitted unless approved by the Architect/Engineer.

C. Machine mixing shall be done in an approved batch mixer. Sand and gravel shall be measured by weighing. Mixing shall be continued for at least one minute after all materials are in the mixing drum at a speed of not less than twelve nor more than eighteen revolutions per minute. The volume of the mixing materials per batch shall not exceed manufacturer's rated capacity of mixer. A water gauge shall be provided to deliver the exact predetermined amount of water for each batch. Mixing shall be continued for at least 1 minute for 1 cubic yard of concrete plus 1/4 minute for each additional cubic yard of concrete after all materials.

D. Transit mix concrete shall conform to the specification and tests herein described and to ASTM C-94 and ACI-304, most current edition(s); and further provided that the central plant producing the concrete and equipment transporting it are, in the opinion of the Architect, suitable for production and transportation of controlled concrete. The maximum elapsed time between the time of the introduction of water and placing shall be one hour.

E. Exterior concrete exposed to weather: Water cement ratio shall not exceed 6 1/2 gallons per sack of cement and an air-entraining agent approved by the Architect shall be added to obtain concrete with an air content not less than 4% nor more than 6% conforming to ASTM C-175, latest edition.

F. Ready-mix Concrete: Comply with the requirements of ASTM C 94, and as specified herein.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall notify the Architect, Construction Manager (when applicable) and the approved testing laboratory at least 24 hours in advance of the time he intends to use ready mixed concrete so that an inspector may be assigned to the plant to supervise the mix, and be available at the site to witness pour and sampling.

B. With each delivery of concrete, furnish to the superintendent at the building site a delivery slip (certified by laboratory representative) showing mix, quantity of cement, fine and coarse aggregates, and water, and time of departure from the plant.

C. Under no circumstances shall transit-mixed concrete be delivered from the plant, unless mix design has been approved by the Architect and inspector of testing laboratory. The approved plant and its operating equipment shall be under the supervision of the testing laboratory appointed by and directly responsible to the Architect.

D. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.02 FORMS

A. Design, erect, support, brace, and maintain form work to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.

B. Design form work to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

   1. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, etc., or other debris just before concrete is placed. Retightening forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.03 PREPARATION OF FORM SURFACES

A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to

acceptable surface condition.

B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

C. Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

D. Coat steel forms with a non-staining, rust preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.04 VAPOR RETARDER INSTALLATION

A. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour. Lap joints and seal with appropriate tape.

B. All concrete slabs on grade or fill shall receive membrane placed on porous fill prior to placing reinforcing. Membrane shall be placed with 6" laps at ends and sides, and without tears or ruptures at the time concrete is placed thereon.

C. Both standard vapor barrier and pre-molded membrane when applicable shall be installed in accordance with the manufacturers requirements.

3.05 PLACING OF REINFORCEMENT

A. Comply with *Concrete Reinforcing Steel Institute*'s recommended practice for *"Placing Reinforcing Bars",* for details and methods of reinforcement placement and supports, and as specified herein.

B. All reinforcement shall be rigidly wired in place with adequate spacers and zinc coated tie chairs. Bar supports shall be not more than 4'-0" o.c. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete. Reinforcement for concrete slabs on ground or fill shall be supported on precast concrete bricks. On formwork, galvanized coated chairs or spacers shall be used.

C. Reinforcement shall be placed so that where temperature shrinkage of bars occur, they shall be no closer to top of slab than 3/4". Coordinate with work under Electrical Contract so that conduits may be replaced to obtain this result.

D. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.

E. All reinforcement shall be bent cold. The minimum radius of bend shall be 4 diameters for bars 5/8" round or less and 6 diameters for larger bars.

F. Place reinforcement to obtain at least minimum coverage for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

G. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace overlaps with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

H. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier in accordance with manufacturer’s requirements before placing concrete.

I. Epoxy-Coated Reinforcement: (To be used in all concrete exposed to weather or wet conditions)

1. Field Bending: Field bending shall be done by cold methods only, and only when ambient and bar temperatures are 40 degrees F or higher. Epoxy coating damaged by field bending shall be repaired, or the damaged reinforcement shall be replaced, in accordance with specified tolerances.

2. Field Repair: Repair cut and damaged epoxy coating with epoxy repair coating according to ASTM D 3963/D 3963M or in accordance with the material manufacturer's recommendations. Also coat cut ends, welds, and steel splice members if such procedures are permitted.

3. Tolerances for Coating Damage: Coating damage need not be repaired where the damaged area is less than 0.1 square inch. The maximum amount of coating damage, including repaired and unrepaired areas, shall not exceed 2 percent of the surface area of the bar.

4. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

J. Zinc-Coated Reinforcement: Repair, cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.

3.06 EXPANSION JOINTS

A. Joints for slabs on ground shall be formed with preformed, non-exuding bituminous fiber expansion filler, which shall extend full length and depth of slabs.

B. Vertical expansion joints shall be constructed complete with water dams or waterstops and joint filler.

C. Joint material in exterior concrete, sidewalks, plazas, stairs, ramps, curbs, etc. shall be held 1/4" from finished surface and finished with approved traffic grade sealant.

3.07 OTHER JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints to girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls as indicated per typical detail. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construction contraction joints for a depth as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2 mm-) wide joints 1" deep into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealant," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip section together.

E. Doweled Joints: Install dowel bards and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

1. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

2. Install anchor bolts, accurately located, to elevations required.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed straps for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.09 CONCRETE PLACEMENT

A. The Contractor shall notify the Owner, the Architect, the Construction Manager (when applicable) and the testing laboratory at least 48 hours in advance of the time he intends to place concrete in order to afford them the opportunity to observe placing operations. The Contractor shall obtain the Architect's and testing laboratory's permission prior to placing concrete.

B. All forms must be absolutely clean and free from shavings and dirt prior to starting concrete operations.

C. Under no circumstances shall concrete be deposited in or under water, nor on muddy or frozen ground.

D. Pre-placement Inspection: Before placing concrete, the Contractor shall inspect and complete all formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used. Protect adjacent finish materials against spatter during concrete placement.

1. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement under any and all conditions of placement.

E. General: Comply with ACI 304 *"Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"* and as herein specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

2. Before depositing new concrete against concrete which has set, the forms shall be re-tightened and the surface of the concrete placed earlier shall be thoroughly roughened, cleaned of all foreign matter and laitance, shall be slushed with water, slushed with a coat of neat cement grout, and the new concrete shall be placed before the grout has attained its initial set, or the work shall be performed in such other approved manner as will insure a thorough bonding to the work.

F. All concrete must be placed as rapidly as possible after mixing and thoroughly spaded and rammed in place. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. All possible care is to be exercised to prevent honeycombing. Concrete shall be placed in layers not over 12” thick and shall not be dumped from height over three feet. Concrete that must be placed more than 3 feet below placement level shall be chuted at a slope of not more than 1 in 2 or deposited through elephant trunks.

G. Concrete shall be placed in one operation up to temporary bulkheads, which shall be located, in general, at points of minimum shear.

H. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 12" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

2. All structural concrete shall be placed with the aid of mechanical vibrators. The vibrators shall be of a type and design approved by the Architect and shall be capable of transmitting to the concrete not less than 3,000 impulses per minute. The vibration shall be sufficiently intense to visibly affect the concrete over a radius of at least 2'-0" around the point of application but shall not be applied long enough to segregate the ingredients. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. Enough vibration shall be used to cause all the concrete to flow or settle readily into place. The vibration shall be of internal type, applied directly to the concrete and not through the forms, except in sections too thin to permit the insertion of the internal type, in which case form vibration may be employed at the discretion of the Architect. Do not use vibrators to transport concrete inside forms.

I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement operations.

4. Slope surfaces uniformly to drains where required.

5. For exterior placement such as sidewalks, plazas, driveway aprons, curbing and equipment pads where no vapor barrier is required, the subgrade shall be moist before placing concrete. Dry or dusty subgrades shall be moistened to a minimum depth of one inch (1") prior to placing concrete.

J. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement.

a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

b. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

c. Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

K. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified. Concrete placed in warm weather shall be kept well sprinkled with water for at least one week after placing, unless other approved curing methods are used. No concrete shall be placed when the atmospheric temperature is above 90°F.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

a. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.

3. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions, only upon approval of the Architect.

3.10 FINISH OF FORMED SURFACES

A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or by other construction, unless otherwise shown or indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed to view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, immediately following form removal and not later than one day after form removal.

1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.

D. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment.

1. Combine one part Portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.

2. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off, smooth, and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 MONOLITHIC SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

1. After placing slabs, plane surface to tolerances for floor flatness (F_F) of 15 and floor levelness (F_L) of 13. Slope surfaces uniformly to drains where required. After leveling, while sill plastic, roughen surface before final set, with stiff brushes, brooms, or rakes to provide a profile amplitude of ¼ inch (6 mm) in one direction.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened

sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Check and level surface plant to tolerances of F_F 18 - F_L 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system and below wood flooring systems.

1. After floating, begin first trowel finish operation using a hand or power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances according to ASTM E 1155 (ASTM E1155M)for a randomly trafficked floor surface. Grind smooth surface defects which would telegraph through applied floor covering system.

    a. Specified overall values of flatness: (F(F)35, and levelness, F(L)25, with minimum local values of flatness F(F)24 and levelness F(L)17 for slabs on grade.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with either thin-set or thick-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, sidewalks, plazas, aprons, curbs and ramps, and elsewhere indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms and ramps. Apply according to manufacturer’s written instructions and as follows:

1. Uniformly spread 25/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.

2. After broadcasting and tamping, apply float finish.

3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer’s written instructions as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.

2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand

or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.

3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.12 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 7 days.

2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

3. The Contractor shall continuously protect cement finish floors from damage for the duration of the work by such means as approved by the Architect and shall leave same in perfect condition to receive other floor finishes or where exposed in the finished work, they shall be in perfect condition at completion and acceptance of the building.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified as appropriate to finished condition of concrete surface.

1. Provide moisture curing by following methods:

a. Keep concrete surface continuously wet by covering with water.
b. Continuous water-fog spray.
c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and continuously keeping wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Provide curing and sealing compound to exposed interior slabs (no other finish materials) and to exterior slabs, walks, and curbs as follows:

a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

b. Do not use membrane curing and sealing compounds compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, vinyl tile, linoleum, glue-down carpet, etc.), painting, and other coatings and finish materials

unless otherwise acceptable to the Architect.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

3.13 REMOVAL OF FORMS

A. Form work not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard not to be damaged by form removal operations and provided curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete-in-place unit concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit remove of forms without loosening or distributing shores.

B. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.14 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new form work.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms close to joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

3.15 SHORES AND RESHORES

A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and re-shoring.

1. Do not remove shoring or re-shoring until measurement of slab tolerances is complete.

B. In multi-story construction, extend shoring or re-shoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and re-shores to avoid damage to concrete. Locate and provide adequate re-shoring support construction without excessive stress or deflection.

3.16 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer finishing machines and equipment.

    1. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

E. Pits, Trenches, etc.: Build all pits, pit cleanouts, trap pits, trenches, curbs, and pads as required by the drawings and by job conditions.

F. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous watertight diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer’s written instructions.

G. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer’s written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.17 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

    1. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

        a. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains or other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Patching compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

5. Repair isolated random cracks and single holes not over 1" diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

6. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

7. Repair methods not specified above may be used, subject to acceptance of Architect.

3.18 CUTTING, PATCHING, AND REMOVAL

A. The Contractor shall be responsible for all cutting and patching of his work as required to accommodate work of this section and of other sections and contracts.

B. Materials which have become damaged or have been condemned shall be removed from the site.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 035413 – SELF LEVELING GYPSUM UNDERLAYMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

B. Related Sections include the following:

1. Section 013563 – LEED Requirements
2. Section 017419 – Construction Waste Management
3. Section 028218 – Removal of Asbestos Contaminated Substrate Material
4. Section 033000 – Cast-in-Place Concrete
5. Section 090561.13 – Moisture Vapor Emission Control
6. Section 093013 – Ceramic Tile
7. Section 096519 – Resilient Flooring
8. Various other Division 09 Flooring Sections.

1.02 SCOPE

A. The work under this section of the specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this section as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Provide a self-leveling underlayment in accordance with the Contract Documents.

2. This Section includes ARDEX GS-4™ a self-leveling underlayment used for repairing and finishing above grade gypsum and wood subfloors prior to the installation of new floor covering.

a. ARDEX GS-4™ Premium Self-Leveling Repair Underlayment

b. ARDEX P 51™ Primer

c. ARDEX Feather Finish® Self-Drying, Cement-Based Finishing Underlayment

B. For this project, it is the expressed intent that all self-leveling products are to be provided in accordance with the Specifications by the General Contractor at all necessary and appropriate thicknesses at all locations requiring self-leveling product application due to new or existing subfloors not meeting required finish flooring product tolerances or infill of recessed subfloors. Refer to the specifications and manufacturers requirements for additional tolerance requirements specific to each type of finish flooring.

1.03 REFERENCES

A. ASTM C109M, Compressive Strength Air-Cure Only
B. ASTM C348, Flexural Strength of Hydraulic-Cement Mortars
C. ASTM F2170, Relative Humidity in Concrete Floor Slabs Using in situ Probes
D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
E. ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

1.04 QUALITY ASSURANCE

A. Self-leveling underlayment shall be "Ardex GS-4" as manufactured by Ardex, Inc., 400 Ardex Park Dr, Aliquippa PA 15001, www.ardexamericas.com; or Architect approved equal.

1. Installation of the ARDEX product must be completed by a factory-trained applicator, such as an ARDEX LevelMaster® Elite, Choice Contractor or INSTALL Substrate Prep Certified Installer, using mixing equipment and tools approved by the manufacturer. Please contact ARDEX Engineered Cements (724) 203-5000 for a list of recommended installers.

2. Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for not less than 10 years. Contact Manufacturer Representative prior to installation.

3. Underlayment shall be able to be installed from 1/8” to 2” neat and up to 5” thick with aggregate.

4. Underlayment shall be walkable after 3 hours at 70°F and allow floor covering to be installed after 3 days.

5. Underlayment compressive strength shall be 5500 psi at 28 days per ASTM C109/mod (air cure only)

6. After proper substrate preparation, underlayment shall be suitable for use over the following substrates.

   a. Rehabilitation projects: structurally sound plywood, OSB and strip wood flooring.

B. ARDEX GS-4™ installed as part of a floor system, shall be installed in conjunction with the recommended ARDEX Tile & Stone Installation Materials or WW HENRY Flooring Adhesive, as appropriate, to provide the ARDEX SystemOne 5- or 10-year comprehensive warranty, depending on the system installed

1.05 SUBMISSIONS

A. General: Comply with provisions of Section 013300 – Submittal Procedures.

B. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Safety Data Sheets.

1. Complete materials list of all items proposed to be furnished and installed under this Section.

2. Manufacturer's specifications and other data required demonstrating compliance with specified requirements.

3. Manufacturer's certification that the product specified is suitable for the intended use when installed according to the parameters described in the manufacturer's printed literature and installation instructions.

4. Installer Qualifications: Manufacturer’s written approval that installer is trained and qualified to perform work of this type.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Store products in a dry area with temperature maintained between 50° and 85°F and Protect from direct sunlight.

C. Handle products in accordance with manufacturer's printed recommendations.

1.07 PROJECT CONDITIONS

A. ARDEX GS-4™ is a gypsum-based material. Do not install in applications on or below grade or in any areas subject to high moisture conditions. Do not install below 50°F surface temperature. Install quickly if floor is warm and follow hot weather precautions available from the ARDEX Technical Service Department. Never mix with cement or additives other than ARDEX-approved products.

PART 2 – PRODUCTS

2.01 GYPSUM CEMENT UNDERLAYMENT

A. Self-Leveling, Gypsum Cement-Based Underlayment:

1. The gypsum cement-based self-leveling, underlayment or patching material shall be:

   a. ARDEX GS-4™ self-leveling underlayment (for all standard above grade self-leveling), or Architect approved equal.

   b. Performance and Physical Properties: Meet or exceed the following values for material cured at 70°F (21°C) and 50 percent relative humidity:

      1) Application: Barrel Mix or Pump
      2) Flowing Time: Approximately 10 minutes
      3) Initial Set, ASTM C191: Approximately 30 minutes
      4) Final Set, ASTM C191: Approximately 60 minutes
      5) Compressive Strength: 5,500 psi at 28 days, ASTM C109M
      6) Flexural Strength: 1,500 psi at 28 days, ASTM C348
      7) Flammability, ASTM E84-81a:
         Flame Spread -0-
         Fuel Contribution -0-
         Smoke Development -0-
      8) VOC: 0
      9) Coverage: Approx. 22 sq.ft. per bag at 1/4", 11 sq.ft. per bag at 1/2".
      10) Warranty: Ardex Engineered Cements Warranty – 5 years.

   c. Gypsum: Requires two applications of ARDEX P 51™ Primer.

   d. Wood: Undiluted ARDEX P 51™ Primer.

2. Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

3. Portland cement-based trowel-grade underlayment (for patch & skim coating) shall be:

   a. ARDEX SD-P® - Instant Patch Self-Drying, Fast-Setting Concrete Underlayment Patch (for repairing substrates and ramping).

   b. ARDEX Feather Finish® - Self-Drying, Cement-Based Finish Underlayment

2.02 MIX DESIGNS

A. ARDEX GS-4™ - Self-Leveling Underlayment

1. Standard mixing ratio: ARDEX GS-4™ shall be mixed in 2-bag batches at one time. Mix each bag of ARDEX GS-4™ (50 lb.) with 4 quarts of water. Product shall be mixed in T-10 mixing drum using a T-4 mixing paddle and a 1/2" heavy-duty drill (min. 650 rpm). Mix thoroughly for approximately 2-3 minutes to obtain a lump-free mixture. Follow written instructions per the ARDEX GS-4™ bag label.

2. For pump installations, ARDEX GS-4™ shall be mixed using the Ardex Levelcraft Automatic Mixing Pump. Start the pump at 130 gallons of water per hour, and then adjust to the minimum water reading that still allows self-leveling properties. DO NOT OVERWATER. Check the consistency of the product on the floor to ensure a uniform distribution of the sand aggregate at both the top surface and bottom of the pour. If settling is occurring, reduce the water amount and recheck. Conditions during the installation, such as variations in water, powder, substrate, and ambient temperature, require that the water setting be monitored and adjusted carefully to avoid overwatering.

B. ARDEX SD-P® - Instant Patch Self-Drying, Fast-Setting Concrete Underlayment Patch (for repairing substrates and ramping):

1. Mix 1 bag of Ardex SD-P (40 lbs.) with 4 quarts of water. Product can be mixed in a clean 5-gallon pail using a mixing paddle and a ½" heavy-duty drill (min. 650 rpm). Mix thoroughly for approximately 2-3 minutes to obtain a lump-free mixture. Follow written installation instructions per Ardex SD-P bag label.

C. ARDEX Feather Finish® - Self-Drying, Cement-Based Finishing Underlayment (for flash patching & skim coating):

1. The recommended mixing ratio is 2 parts powder to 1 part water by volume. Mix the ARDEX Feather Finish® powder with water to the desired trowelable consistency using a margin trowel or an approved paddle and drill.

PART 3 - EXECUTION

3.01 GENERAL

A. In addition to the general procedures described herein, refer to manufacturer's current published product literature for complete installation details for the underlayment system being installed.

3.02 SUBSTRATE PREPARATION

A. General: Prepare substrate in accordance with manufacturer's instructions.

1. Prior to proceeding please refer to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary using shot blasting or other. **Acid etching and the use of sweeping compounds and solvents are not acceptable.**

2. It is the responsibility of the installation contractor to ensure that the subfloor is thoroughly clean and properly anchored prior to the installation of the Ardex material.

3. Prior to installation, substrates shall be inspected and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering.

B. Wooden subfloors: Prepare substrate in accordance with manufacturer's instructions.

1. The wood subfloor either must be solid hardwood flooring; a minimum of 3/4" (19 mm) tongue-and-groove, APA-rated Type 1, exterior exposure plywood; or an approved OSB equivalent. The wood subfloor must be constructed according to prevailing building codes and must be solid and securely fixed to provide a rigid base free of undue flex. Any boards exhibiting movement must be properly fastened to create a sound, solid subfloor. The surface of the wood must be clean and free of oil, grease, wax, dirt, varnish, shellac and any contaminant that might act as a bond breaker. If necessary, sand down to bare wood. A commercial drum sander can be used to sand large areas. Do not use solvents, strippers or cleaners. Vacuum all dust and debris. Open joints should be filled with ARDEX FEATHER FINISH®. It is the responsibility of the installation contractor to ensure that the wood subfloor is thoroughly clean and properly anchored prior to the installation of any ARDEX material.

    a. Note: ARDEX Feather Finish® shall be used to fill in the seams in strip wood so the ARDEX GS-4™ Self Leveling Underlayment does not flow in to the seams.

3.03 JOINT PREPARATION

A. Moving Joints – honor all expansion and isolation joints up through the underlayment or Ardex MC Moisture Control System.

B. Saw Cuts and Control Joints – fill all non-moving joints with ARDEX Feather Finish® or ARDEX SD-P®.

C. When using an Ardex MC Moisture Control System, installation shall be in accordance with manufacturers written technical instructions for the treatment of saw cuts, control joints and dormant cracks.

D. All cracks and non-moving joints in the subfloor shall be repaired to minimize telegraphing through the underlayment.

3.04 APPLICATION OF ARDEX GS-4

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Priming for gypsum substrates: Make an initial application of ARDEX P 51 mixed 3:1 with water and apply evenly with a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to thoroughly (1 - 3 hours). Install a second application of ARDEX P 51 mixed 1:1 with water. Allow primer to dry to a clear, thin film (min. 3 hours, max. 24 hours). Underlayment shall not be applied until the primer is dry.

2. Priming for wood subfloor: Apply ARDEX P 51at full strength (do not dilute). Apply directly to prepared wood with a short-nap or sponge paint roller, leaving a thing coat of primer. Do not leave any bare spots. Brush off puddles and excess primer. Allow to dry to a clear, thin film (min. 3 hours, max.24 hours).

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 4 quarts (3.8 L) of clean potable water per two 50 lb. (22.7 kg) bag.

2. Mix using a ½” (650 rpm) low speed heavy-duty mixing drill with an ARDEX T-1 mixing paddle. Do not overwater.

3. Aggregate mix: For areas to be installed over 2” (5 cm) thick, aggregate may be added to reduce material costs. Mix ARDEX GS-4™ with water first, then add 1 part by volume of washed, dry, well-graded 1/8" to 3/8" (3 – 9.5 mm) pea gravel aggregate. Please note that the aggregate size must not exceed 1/3 the depth of the pour. Do not use sand. Note: The addition of aggregate will diminish the workability of the product and may make it necessary to install a neat coat to obtain a smooth surface. Allow the initial application to dry for 12 – 16 hours, and then prime this layer with ARDEX P-51mixed 1:1 with water as stated above. Allow to dry to a clear, thin film (min. 3 hours, max.24 hours). Ardex recommends a ¼” application of ARDEX GS-4™ neat to be installed as the finish coat.

4. For pump installations, ARDEX GS-4™ shall be mixed using the ARDEX ARDIFLO™ Automatic Mixing Pumps. Contact the ARDEX Technical Service Department (888) 512-7339 for complete pump operation instructions.

E. Application: Comply with manufacturer's printed instructions and the following.

1. ARDEX GS-4™ must be installed at a minimum thickness of 1/8” (3 mm) over the highest point in the floor, which typically results in an average thickness of 1/4” (6 mm) over the entire floor. ARDEX GS-4™ can be installed up to 2” (5 cm) over large areas neat, and up to 5” (12.7 cm) with the addition of proper aggregate. ARDEX GS-4™ can also be featheredged to match existing elevations. For applications over in-floor, hydronic radiant heating systems, the ARDEX GS-4™ must be installed over the tubes to a height that ensures that the tops of the tubes are covered with a minimum ¼” of ARDEX GS-4™. To match existing elevations, ARDEX GS-4™ can be tapered to as thin an application as the sand in the material will allow. If a true featheredge is needed, ARDEX recommends using ARDEX FEATHER FINISH®.

2. Pour or pump the liquid ARDEX GS-4™ and spread in place with the ARDEX T-4 Spreader. Use the ARDEX T-5 Smoother and featheredge and touch-up. Wear non- metallic cleats to avoid leaving marks in the liquid ARDEX GS-4™.

F. Curing:

1. ARDEX GS-4™ can be walked on in 2-3 hours. Floor coverings can be installed after the underlayment has dried thoroughly. Allow the installation to dry a minimum of 48 hours prior to mat testing in accordance with ASTM D4263. To do this, place a piece of heavy plastic or a smooth rubber mat down over a 2’ X 2’ area. After 24 hours, lift the barrier material and inspect for surface darkening. A darkened area indicates excessive moisture is still present, and further drying time is required. Repeat the above test at regular intervals until no darkening is observed.

2. Once the installation is deemed dry, prime the entire area with ARDEX P 51 mixed with 3 parts water by volume. Apply the primer as outlined in the Priming section. Allow drying to a clear, thin film (min. 3 hours, max. 24 hours) before applying the thin set mortar or adhesive and floor covering. The application of ARDEX P 51 will help ensure that the adhesive or setting material has sufficient open time prior to placing the floor covering.

3. Drying time is a function of jobsite temperature and humidity conditions. While a 1/4” (6 mm) thick installation may be dry enough for some types of floor covering after only a few days, additional drying time may be necessary for deeper installations or for the installation of more moisture-sensitive flooring. Low substrate temperatures and/or high ambient humidity will extend the drying time. Adequate ventilation and heat will aid drying. Forced drying can dry the surface of the underlayment prematurely and is not recommended.

3.05 APPLICATION OF ARDEX SD-P

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Porous concrete:

a. While no primer is required to obtain a solid bond when installing ARDEX SD-P over concrete, ARDEX P 51 can be used to prime a properly prepared concrete substrate prior to installing ARDEX SD-P. The use of ARDEX P 51 will improve the workability of the product, prevent it from drying out too fast, and help ensure that any residual dust on the surface of the concrete will be bound up so that it will not interfere with the bond.

b. For this application, mix ARDEX P 51 with an equal part of water, and prime the properly prepared concrete surface using a soft bristle push broom. Once the primer has dried (min. 30 minutes, max. 24 hours). It is critical to ensure that the ARDEX P 51 is dry prior to proceeding with the next installation step. To determine if the ARDEX P 51 is dry after a minimum of 30 minutes (max. 24 hours), pour water onto the surface of the primer in several areas and rub it with your finger. If the water remains clear, the primer is dry. If the water turns cloudy or milky, additional drying time is needed.

2. Burnished concrete, epoxy coating systems, terrazzo, ceramic, quarry and porcelain tiles, concrete treated with silicate compounds shall be primed with ARDEX P 82. Do not leave any bare spots. Brush off puddles and excess primer. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 4 quarts (3.8 L) of clean potable water per 40-pound (18 kg) bag.

2. Mix using a ½” (12 mm, 650 rpm) low speed heavy-duty mixing drill with an ARDEX T-2 ring mixing paddle. Do not overwater.

3. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard “gutter hook” vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air quality management.

E. Application: Comply with manufacturer's printed instructions and the following.

1. ARDEX SD-P can be installed from a true featheredge up to 1” (25.4 mm) over large areas neat and up to 3” (7.6 cm) with the addition of proper aggregate. ARDEX SD-P can also be featheredged to match existing elevations. There is no minimum thickness requirement for this product. Use the least amount possible to attain the desired smoothness. The thickness of the application should be calculated based on the surface profile of the substrate and the specified tolerances of the floor covering.

2. For areas with a thickness greater than 1” (25.4 mm), mix ARDEX SD-P with washed and well-graded 1/8” – ¼” (3 – 6 mm) pea gravel. Mix the ARDEX SD-P with water first, and then add

part aggregate by volume, mixing until the aggregate is completely coated. Do not use sand. If the aggregate is wet, reduce the amount of water to avoid overwatering.

3. For applications of ARDEX SD-P over non-porous substrates, the maximum thickness is ¼" (6 mm).

4. Apply the ARDEX SD-P to the substrate with a wood or magnesium float to obtain a solid mechanical bond. Allow the material to take set (approx. 30 minutes) then finish the surface using a steel trowel.

F. Curing:

1. As soon as the ARDEX SD-P can be worked on without damaging the surface (approx. 90 minutes), standard floor coverings such as ceramic tile, VCT, sheet vinyl and carpeting can be installed. If installing wood flooring, or, if high-performance adhesives will be used, such as epoxies or urethanes, ARDEX SD-P must first cure for 16 hours.

3.06 APPLICATION OF ARDEX FEATHER FINISH

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Gypsum: Make an initial application of ARDEX P 51 diluted with 3 parts water using a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry thoroughly (1 to 3 hours) before proceeding with the second application of ARDEX P 51 diluted 1:1 with water. Allow thorough drying to a clear, thin film (min. 3 hours, max. 24 hours).

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 2 1/2 quarts (2.4 L) of clean potable water per 10-pound (4.5 kg) bag.

2. Mix using a ½" (12 mm, 650 rpm) low speed heavy-duty mixing drill with an ARDEX T-2 ring mixing paddle. Do not overwater.

E. Application: Comply with manufacturer's printed instructions and the following.

1. ARDEX FEATHER FINISH can be installed from a true featheredge up to ½" (12.7 mm) over large areas. It can also be installed up to any thickness in small, well-defined areas.

2. Apply the ARDEX FEATHER FINISH to the substrate with the flat side of a trowel to obtain a solid mechanical bond before applying the desired thickness.

F. Curing:

1. As soon as the ARDEX FEATHER FINISH can be worked on without damaging the surface (15-20 minutes), standard floor coverings such as VCT, sheet vinyl and carpeting can be installed. If installing wood flooring, or, if high-performance adhesives will be used, such as epoxies or urethanes, ARDEX FEATHER FINISH must first cure for 16 hours (70°F).

3.07 PREPARATION FOR FLOORING INSTALLATION

A. Underlayment can accept finish floor covering materials after 2-3 days at 70°F and 50% relative humidity.

B. The surface of the underlayment shall be checked to ensure that it meets the flooring manufacturer's specifications for flatness before beginning the flooring installation. Areas out of tolerance shall be repaired using the appropriate Ardex underlayment (described herein based upon tolerance discrepancy) as required at the contractors expense.

C. Due to the wide range of adhesives that are used to install floor coverings, some adhesives may dry more quickly over underlayments than over other substrates. If this condition occurs, priming the surface of the underlayment with ARDEX P-51 Primer diluted 1:3 with water will even out the drying of the adhesive. Allow the primer to dry 1-3 hours before proceeding with the adhesive installation.

3.08 FIELD QUALITY CONTROL

A. Where specified, field sampling of the Ardex underlayment is to be done by taking an entire unopened bag of the product being installed to an independent testing facility to perform compressive strength testing in accordance with ASTM C 109/modified: air-cure only. There are no in situ test procedures for the evaluation of compressive strength.

3.09 PROTECTION

A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

END OF SECTION

DIVISION 03 – CONCRETE

SECTION 035416 – SELF LEVELING CEMENTITIOUS UNDERLAYMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

B. Related Sections include the following:

1. Section 013563 – LEED Requirements
2. Section 017419 – Construction Waste Management
3. Section 028218 – Removal of Asbestos Contaminated Substrate Material
4. Section 033000 – Cast-in-Place Concrete
5. Section 090561.13 – Moisture Vapor Emission Control
6. Section 093013 – Ceramic Tile
7. Section 096519 – Resilient Flooring
8. Various other Division 09 Flooring Sections.

1.02 SCOPE

A. The work under this section of the specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this section as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Provide a self-leveling cementitious underlayment in accordance with the Contract Documents.

2. This system consists of the use of a primer and a mix of special cements and binders which, when mixed with water, becomes a highly liquid cement compound that seeks its own level and produces a smooth and flat surface. Finished surface shall be true to plane in accordance with ACI 117, Standard Specifications for Tolerances for Concrete Construction & Materials, or as directed by the floor finish manufacturer.

3. This Section includes ARDEX K 15® a self-leveling underlayment that consists of a blend of Portland cement and other hydraulic cements and polymers that is used to level and smooth interior concrete, terrazzo, well-bonded ceramic & quarry tile, epoxy coating systems, wood, metal and properly prepared, non-water-soluble adhesive residue on concrete prior to the installation of finish flooring on all grade levels.

   a. ARDEX K 15® Premium Self-Leveling Underlayment

   b. ARDEX P 51™ Primer

   c. ARDEX P 82™ Ultra Prime

   d. ARDEX EP 2000™ Substrate Preparation Epoxy Primer

   e. ARDEX E 25™ Resilient Emulsion

   f. ARDEX Feather Finish® Self-Drying, Cement-Based Finishing Underlayment

B. For this project, it is the expressed intent that all self-leveling products are to be provided in

accordance with the Specifications by the General Contractor at all necessary and appropriate thicknesses at all locations requiring self-leveling product application due to new or existing slabs/subfloors not meeting required finish flooring product tolerances or infill of recessed slabs/subfloors. Refer to the specifications and manufacturers requirements for additional tolerance requirements specific to each type of finish flooring.

1.03 REFERENCES

A. ASTM C109M, Compressive Strength Air-Cure Only
B. ASTM C348, Flexural Strength of Hydraulic-Cement Mortars
C. ASTM F2170, Relative Humidity in Concrete Floor Slabs Using in situ Probes
D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
E. ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

1.04 QUALITY ASSURANCE

A. Self-leveling underlayment concrete shall be " ARDEX K 15®" as manufactured by Ardex, Inc., 400 Ardex Park Dr, Aliquippa PA 15001, www.ardexamericas.com; or Architect approved equal.

   1. Underlayment shall be able to be installed from 1/8” over the highest point in the space and up to 1 1/2” in one pour and up to 5” with the addition of aggregate. It may also be feathered to match existing elevations.

   2. Underlayment shall be walkable after 2-3 hours and allow floor covering to be installed after 16 hours at 70°F.

   3. Underlayment compressive strength shall be 5500 psi after 28 days per ASTM C109/mod (air cure only)

   4. After proper substrate preparation, underlayment shall be suitable for use over the following substrates.

      a. New construction: Un-level concrete, rough concrete, rained-on concrete, frozen concrete, unfinished concrete, rough-screeded concrete, wooden or metal subfloors.

      b. Rehabilitation projects: Existing concrete, wood, metal, terrazzo, quarry tile, ceramic tile, and over cutback adhesive residue.

B. Installation of the ARDEX product must be completed by a factory-trained applicator, such as an ARDEX LevelMaster® Elite, Choice Contractor or INSTALL Substrate Prep Certified Installer, using mixing equipment and tools approved by the manufacturer. Contact ARDEX Engineered Cements (724) 203-5000 for a list of recommended installers.

C. Product must have a hydraulic cement-based inorganic binder content as the primary binder which includes portland cement per ASTM C150: Standard Specification for Portland Cement and other specialty hydraulic cements. Gypsum-based products are not acceptable.

D. Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for not less than 10 years. Contact Manufacturer Representative prior to installation.

1.05 SUBMISSIONS

A. General: Comply with provisions of Section 013300 – Submittal Procedures.

B. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Safety Data Sheets.

1. Complete materials list of all items proposed to be furnished and installed under this Section.

2. Manufacturer's specifications and other data required demonstrating compliance with specified requirements.

3. Manufacturer's certification that the product specified is suitable for the intended use when installed according to the parameters described in the manufacturer's printed literature and installation instructions.

4. Installer Qualifications: Manufacturer's written approval that installer is trained and qualified to perform work of this type.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Store products in a dry area with temperature maintained between 50° and 85°F and Protect from direct sunlight.

C. Handle products in accordance with manufacturer's printed recommendations.

1.07 PROJECT CONDITIONS

A. Do not install material below 50°F surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section. Install quickly if the substrate is warm and follow warm weather instructions available from the ARDEX Technical Service Department.

1.08 WARRANTY

A. ARDEX K 15® installed as part of a floor system, shall be installed in conjunction with the recommended ARDEX Tile & Stone Installation Materials or WW HENRY Flooring Adhesive, as appropriate, to provide the ARDEX SystemOne comprehensive warranty, depending on the system installed.

PART 2 – PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Hydraulic Cement-Based Self-Leveling Underlayment:

1. The Portland cement-based self-leveling, cementitious underlayment or patching material shall be: ARDEX K 15® self-leveling underlayment concrete (for all standard self-leveling); or Architect approved equal.

a. Primer:

1) Standard Absorbent Concrete: ARDEX P 51™ Primer.
2) Extremely Absorbent Concrete: May require two applications of ARDEX P 51™ to minimize the potential for pinholes forming in the ARDEX K 15.
3) Wood: ARDEX P 82™ Ultra Prime.

4) Metal: ARDEX EP 2000™ Substrate Preparation Epoxy Primer.
5) Other Non-Porous Substrates (burnished concrete, terrazzo, well-bonded ceramic, quarry and porcelain tiles, epoxy coating systems and non-water-soluble adhesive residue on concrete and concrete treated with silicate compounds): ARDEX P 82™ Ultra Prime.

b. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F+/-3°F and 50% +/-5% relative humidity:

1) Application: Barrel Mix or Pump
2) Flowing Time: Approximately 10 minutes
3) Initial Set, ASTM C191: Approximately 30 minutes
4) Final Set, ASTM C191: Approximately 90 minutes
5) Compressive Strength: 5,500 psi at 28 days, ASTM C109M
6) Flexural Strength: 1,200 psi at 28 days, ASTM C348
7) Flammability, ASTM E84-81a:
Flame Spread -0-
Fuel Contribution -0-
Smoke Development -0-
8) VOC: 0
9) Coverage: Approx. 30 sq.ft. per bag at 1/4".

2. Primer for non-porous subfloors, cut-back and non-water soluble adhesive residues, and metal and wooden subfloors shall be ARDEX P 82™ Ultra Prime.

3. The additive to be mixed with ARDEX K 15® when used over cut-back adhesive, metal, or wooden subfloors shall be ARDEX E 25™ Resilient Emulsion.

4. Aggregate shall be well-graded, washed pea gravel (1/8" to 1/4" or larger) for use when underlayment is installed over 1 1/2" thick. (Max. installation is 5”)

5. Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

6. Portland cement-based trowel-grade underlayment (for patch & skim coating) shall be:

a. ARDEX SD-P® Instant Patch Self-Drying, Fast-Setting Concrete Underlayment Patch (for repairing substrates and ramping).

b. ARDEX Feather Finish® Self-Drying, Cement-Based Finishing

B. Moisture Vapor Suppression (For use where the level of moisture emissions from the concrete slab exceed the maximum permitted by the manufacturer of the finished flooring):

1. Moisture Control System shall be ARDEX MC™ Rapid one-coat moisture control system for use over new or existing concrete. Use of a moisture control system shall be field determined based upon relative humidity measurements within the concrete in accordance with ASTM F2170 or surface of the concrete in accordance with ASTM F2420. Labor and material costs for the installation of the moisture control system are excluded from the contractors Base Bid and shall be applied via agreed upon Change Order or Allowance Authorization in accordance with the General Conditions of Contract.

2.02 MIX DESIGNS

A. ARDEX K 15® Self-Leveling Underlayment Concrete (standard underlayment):

1. Standard mixing ratio: ARDEX K 15® shall be mixed in 2-bag batches at one time. Mix each

bag of ARDEX K 15® (55 lb.) with 7 quarts of water. Product shall be mixed in T-10 mixing drum using a T-1 mixing paddle and a 1/2" heavy-duty drill (min. 650 rpm). Mix thoroughly for approximately 2-3 minutes to obtain a lump-free mixture. Follow written instructions per the ARDEX K 15® bag label.

2. Resilient mix for applications over cutback and non-water soluble adhesive residues, wood, and metal: Use 6 qt. of water and 2 qt. of ARDEX E 25™ Resilient Emulsion for each bag of ARDEX K 15®.

3. Aggregate mix: For areas to be installed over 1 1/2" thick and up to 5”, aggregate may be added to reduce material costs. Mix ARDEX K 15® with water first, then add from 1/3 up to 1 part by volume of aggregate (1/8" to 1/4" or larger). Do not use sand.

4. For pump installations, ARDEX K 15® shall be mixed using the Ardex Levelcraft Automatic Mixing Pump. Start the pump at 210 gallons of water per hour, and then adjust to the minimum water reading that still allows self-leveling properties. DO NOT OVERWATER. Check the consistency of the product on the floor to ensure a uniform distribution of the sand aggregate at both the top surface and bottom of the pour. If settling is occurring, reduce the water amount and recheck. If settling is occurring, reduce the water amount and recheck. Conditions during the installation, such as variations in water, powder, substrate, and ambient temperature, require that the water setting be monitored and adjusted carefully to avoid overwatering.

B. ARDEX SD-P® - Instant Patch Self-Drying, Fast-Setting Concrete Underlayment Patch (for repairing substrates and ramping):

1. Mix 1 bag of Ardex SD-P (40 lbs.) with 4 quarts of water. Product can be mixed in a clean 5-gallon pail using a mixing paddle and a ½” heavy-duty drill (min. 650 rpm). Mix thoroughly for approximately 2-3 minutes to obtain a lump-free mixture. Follow written installation instructions per Ardex SD-P bag label.

C. ARDEX Feather Finish® - Self-Drying, Cement-Based Finishing Underlayment (for flash patching & skim coating):

1. The recommended mixing ratio is 2 parts powder to 1 part water by volume. Mix the ARDEX Feather Finish® powder with water to the desired trowelable consistency using a margin trowel or an approved paddle and drill.

PART 3 - EXECUTION

3.01 GENERAL

A. In addition to the general procedures described herein, refer to manufacturer's current published product literature for complete installation details for the underlayment system being installed.

3.02 SUBSTRATE PREPARATION

A. General: Prepare substrate in accordance with manufacturer’s instructions.

B. Concrete:

1. Prior to proceeding please refer to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary using shot blasting or other. **Acid etching and the use of sweeping compounds and solvents are not acceptable.**

2. Substrates shall be inspected in accordance with ASTM F2170 and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering. For areas where moisture vapor emissions exceed the required limits refer to Section 090561.13, Moisture Vapor Emission Control and install the appropriate ARDEX Moisture Control System.

C. Wooden subfloors:

1. The wood subfloor either must be solid hardwood flooring; a minimum of ¾" (19 mm) tongue-and-groove, APA-rated Type 1, exterior exposure plywood; or an approved OSB equivalent. The wood subfloor must be constructed according to prevailing building codes and must be solid and securely fixed to provide a rigid base free of undue flex. Any boards exhibiting movement must be refastened to create a sound, solid subfloor.

2. The wood must be clean and free of all foreign matter. If necessary, sand down to bare wood. Vacuum to remove all dust. Do not use solvent, strippers or cleaners. Open joints should be filled with ARDEX FEATHER FINISH®. It is the responsibility of the installation contractor to ensure that the wood subfloor is thoroughly clean and properly anchored prior to the installation of any ARDEX material.

D. Metal subfloors:

1. Metal subfloors must be rigid, well supported, properly anchored and free of undue flex and vibration. They must also be clean and free of all rust, corrosion and foreign matter. Where required, a corrosive resistant coating should then be applied, and be allowed to dry before priming.

2. Non-lead metal substrates must be mechanically cleaned and profiled to create a bonding surface. Please note that care must be taken when mechanically preparing thin metal foils so that the metal foil is not compromised. Use an #80 or #100 grit sanding screen to mechanically profile the metal surface. A hand or floor sander may be used. After sanding, thoroughly deep vacuum to remove all loose material, and then wipe the metal using a clean, white cloth dampened with 91% isopropyl alcohol. Repeat wiping using a new cloth on each pass until the degree of discoloration on the cloth remains consistent on subsequent passes (typically, approx. 5 – 7 passes). Lightly shot blasting also is suitable. From this point until the metal has been primed, disposable shoe covers should be worn by anyone traversing the surface of the prepared metal. Allow 15 – 20 minutes for residual alcohol to evaporate before proceeding. Contact the Technical Service Department for guidelines on preparing lead substrates.

E. Adhesive residues on concrete must first be tested to make certain they are not water-soluble. Water-soluble adhesives must be completely mechanically removed down to clean concrete. Non-water-soluble adhesives should be prepared to a thin, well-bonded residue using the wet- scraping technique as recommended by the Resilient Floor Covering Institute (www.rfci.com). The prepared residue should appear as nothing more than a transparent stain on the concrete after scraping.

F. Non-porous subfloors such as ceramic, porcelain and quarry tile, burnished concrete, epoxy coating systems as well as terrazzo should be clean and free of all waxes, sealers, dust, dirt, debris and any other contaminant that may act as a bond breaker. If necessary, clean by mechanical methods such as shot blasting.

G. All subfloors, regardless of material, must be solid, thoroughly cleaned, and properly primed. Gypsum, latex patches, asphalt, coal tar and lightweight insulating concrete are not suitable substrates to receive cementitious underlayment.

1. Cut-back and other non-water soluble adhesive residues must be wet-scraped to a thin, solid, well bonded layer.

2. Non-porous surfaces such as ceramic tile, quarry tile, terrazzo etc., should be clean and free of wax and sealers. If necessary, have the surface professionally cleaned.

3. All cracks in the subfloor shall be repaired to minimize telegraphing through the underlayment.

4. Prior to installation, substrates shall be inspected and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering. If moisture vapor emissions exceed the flooring manufacturer's recommendations, installation of an ARDEX MC™ Moisture Control System (ARDEX MC RAPID, MC PLUS or MC Ultra) will be required. For complete installation instructions, please refer to the appropriate ARDEX MC Moisture Control Technical Brochure.

H. ARDEX MC™ Moisture Control System shall be installed in accordance with manufacturers written technical instructions.

3.03 CRACK AND JOINT PREPARATION

A. Moving Joints and Moving Cracks – honor all expansion, isolation joints and moving cracks up through the underlayment. A flexible sealing compound such as ARDEX ARDISEAL™ Rapid Plus Semi-Rigid Joint Sealant may be installed.

B. Saw Cuts, Dormant Control Joints and Dormant Cracks – fill all dormant control joints and dormant cracks with ARDEX ARDIFIX™ Low Viscosity Rigid Polyurethane Crack & Joint Repair or ARDEX FEATHER FINISH® Self-Drying, Cement-Based Finish Underlayment as recommended by the manufacturer.

C. When using an Ardex MC Moisture Control System, installation shall be in accordance with manufacturers written technical instructions for the treatment of saw cuts, control joints and dormant cracks.

3.04 APPLICATION OF ARDEX K-15:

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Note: When using ARDEX P 51, It is critical to ensure that the ARDEX P 51 is dry prior to proceeding with the next installation step. To determine if the ARDEX P 51 is dry after a minimum of 30 minutes (max. 24 hours), pour water onto the surface of the primer in several areas and rub it with your finger. If the water remains clear, the primer is dry. If the water turns cloudy or milky, additional drying time is needed.

2. Primer for standard absorbent concrete subfloors: Dilute ARDEX P 51 1:1 with water and apply evenly with a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, thin film (min. 30 minutes, max. 24 hours). Underlayment shall not be applied until the primer is dry.

3. Primer for extremely absorbent concrete subfloors: Make an initial application of ARDEX P 51 mixed with 3 parts water using a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry thoroughly (1 to 3 hours) before proceeding with the standard application of primer as described above for standard absorbent concrete.

4. Primer for non-porous subfloors such as burnished concrete, terrazzo, well-bonded ceramic, porcelain and quarry tile, epoxy coating systems, wooden subfloors and non-water soluble adhesive residues over concrete: Prime with ARDEX P 82 Ultra Prime. Follow the mixing instructions on the container and apply with a short-nap or sponge paint roller, leaving a thin coat of primer no heavier than a coat of paint. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, slightly tacky film (minimum 3 hours, maximum 24 hours). Underlayment shall not be installed until primer is dry. Note: If a suitable acrylic curing compound has been used on the concrete, test the surface for porosity. If the concrete is porous, prime with ARDEX P 51. If it is non-porous, prime with ARDEX P 82. For wood substrates, once the primer is applied, install 3.4 galvanized, expanded diamond metal lath mesh, stapling approximately every 6 inches (15.2 cm). Do not walk on wet primer.

5. Primer for metal substrates: Prime the prepared subfloor with ARDEX EP 2000 and immediately broadcast fine sand to refusal into the fresh epoxy. After a 16-hour cure remove all excess sand. Remove all excess sand prior to proceeding:

    a. Do not sweep. Using a rubber squeegee, consolidate excess sand into piles.
    b. Shovel the piles of sand into barrels.
    c. Vacuum remaining sand using a heavy-duty, bucket-style (Shop-Vac®-style) vacuum and HEPA dust extraction vacuum system.

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 7 quarts (6.6 L) of clean potable water per 55 lb. (25 kg) bag. For applications over wood and metal, the addition of ARDEX E 25™ Resilient Emulsion is required to increase the resiliency of the ARDEX K 15. In these cases, mix 2 quarts (1.9 L) of ARDEX E 25 with 6 quarts (5.68 L) of water for each bag of ARDEX K 15.

2. Mix using a ½” (12 mm) heavy-duty drill (min. 650 rpm) with an ARDEX T-1 mixing paddle. Do not overwater. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard “gutter hook” vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air quality management.

3. Aggregate mix: For areas to be installed over 1 ½” (4 cm) thick, aggregate may be added to reduce material costs. Mix ARDEX K 15® with water first, then add 1 part aggregate by volume of washed, well-graded 1/8" to 3/8” (3 to 9.5 mm) pea gravel. The aggregate size must not exceed 1/3 the depth of the pour. Do not use sand. Note: The addition of aggregate will diminish the workability of the product and may make it necessary to install a finish coat to obtain a smooth surface. Allow the initial application to dry for 12 to 16 hours, and then prime this layer with ARDEX P 51 mixed 1: 1 with water. Allow the primer to dry (min. 30 minutes, max. 24 hours) before installing the neat coat of ARDEX K 15.

4. For pump installations, ARDEX K 15® shall be mixed using the ARDEX ARDIFLO™ Automatic Mixing Pumps. Contact the ARDEX Technical Service Department (888) 512-7339 for complete pump operation instructions.

E. Application: Comply with manufacturer's printed instructions and the following.

1. Installations over metal and other non-porous substrates should be limited to a thickness of ½” (12.7 mm) unless otherwise approved by the ARDEX Technical Services Department. For all other substrates, ARDEX K 15® must be installed at a minimum thickness of 1/8” (3 mm) over the highest point in the floor, which typically results in an average thickness of ¼” (6 mm) or more over the entire floor. ARDEX K 15® can be installed up to 1 ½” (4 cm) over large areas

neat, and up to 5” (12.7 cm) with the addition of proper aggregate. ARDEX K 15® can also be featheredged to match existing elevations. If a true featheredge is needed, ARDEX recommends using ARDEX FEATHER FINISH® for transitions.

2. Pour or pump the liquid ARDEX K 15® and spread into place with the ARDEX T-4 Spreader. Immediately use the ARDEX T-5 Smoother to smooth the surface. Wear non- metallic cleats to avoid leaving marks in the liquid ARDEX K 15®.

3. Wood subfloors require the use of the mesh-reinforced ARDEX K 15® + E 25™ Resilient Emulsion Underlayment System. After priming, install 3.4 galvanized diamond metal lath by stapling to the wooden subfloor approximately every 6 inches to center.

4. Metal subfloors require the use ARDEX K 15® + E 25™ Resilient Emulsion Underlayment System.

F. Curing:

1. ARDEX K 15® can be walked on in 2-3 hours. Moisture-insensitive tiles such as ceramic, quarry and porcelain can be installed after 6 hours. All other finish floor coverings can be installed after 16 hours at 70°F (21°C). For resinous systems such as epoxy and polyurethane floors please contact the ARDEX Technical Services Department.

3.05 APPLICATION OF ARDEX SD-P

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Porous concrete:

a. While no primer is required to obtain a solid bond when installing ARDEX SD-P over concrete, ARDEX P 51 can be used to prime a properly prepared concrete substrate prior to installing ARDEX SD-P. The use of ARDEX P 51 will improve the workability of the product, prevent it from drying out too fast, and help ensure that any residual dust on the surface of the concrete will be bound up so that it will not interfere with the bond.

b. For this application, mix ARDEX P 51 with an equal part of water, and prime the properly prepared concrete surface using a soft bristle push broom. Once the primer has dried (min. 30 minutes, max. 24 hours). It is critical to ensure that the ARDEX P 51 is dry prior to proceeding with the next installation step. To determine if the ARDEX P 51 is dry after a minimum of 30 minutes (max. 24 hours), pour water onto the surface of the primer in several areas and rub it with your finger. If the water remains clear, the primer is dry. If the water turns cloudy or milky, additional drying time is needed.

2. Burnished concrete, epoxy coating systems, terrazzo, ceramic, quarry and porcelain tiles, concrete treated with silicate compounds shall be primed with ARDEX P 82. Do not leave any bare spots. Brush off puddles and excess primer. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 4 quarts (3.8 L) of clean potable water per 40-pound (18 kg) bag.

2. Mix using a ½" (12 mm, 650 rpm) low speed heavy-duty mixing drill with an ARDEX T-2 ring mixing paddle. Do not overwater.

3. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard "gutter hook" vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air quality management.

E. Application: Comply with manufacturer's printed instructions and the following.

1. ARDEX SD-P can be installed from a true featheredge up to 1" (25.4 mm) over large areas neat and up to 3" (7.6 cm) with the addition of proper aggregate. ARDEX SD-P can also be featheredged to match existing elevations. There is no minimum thickness requirement for this product. Use the least amount possible to attain the desired smoothness. The thickness of the application should be calculated based on the surface profile of the substrate and the specified tolerances of the floor covering.

2. For areas with a thickness greater than 1" (25.4 mm), mix ARDEX SD-P with washed and well-graded 1/8" – ¼" (3 – 6 mm) pea gravel. Mix the ARDEX SD-P with water first, and then add part aggregate by volume, mixing until the aggregate is completely coated. Do not use sand. If the aggregate is wet, reduce the amount of water to avoid overwatering.

3. For applications of ARDEX SD-P over non-porous substrates, the maximum thickness is ¼" (6 mm).

4. Apply the ARDEX SD-P to the substrate with a wood or magnesium float to obtain a solid mechanical bond. Allow the material to take set (approx. 30 minutes) then finish the surface using a steel trowel.

F. Curing:

1. As soon as the ARDEX SD-P can be worked on without damaging the surface (approx. 90 minutes), standard floor coverings such as ceramic tile, VCT, sheet vinyl and carpeting can be installed. If installing wood flooring, or, if high-performance adhesives will be used, such as epoxies or urethanes, ARDEX SD-P must first cure for 16 hours.

3.06 APPLICATION OF ARDEX FEATHER FINISH

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

C. Priming:

1. Gypsum: Make an initial application of ARDEX P 51 diluted with 3 parts water using a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry thoroughly (1 to 3 hours) before proceeding with the second application of ARDEX P 51 diluted 1:1 with water. Allow thorough drying to a clear, thin film (min. 3 hours, max. 24 hours).

D. Mixing: Comply with manufacturer's printed instructions and the following.

1. Add 2 1/2 quarts (2.4 L) of clean potable water per 10-pound (4.5 kg) bag.

2. Mix using a ½" (12 mm, 650 rpm) low speed heavy-duty mixing drill with an ARDEX T-2 ring mixing paddle. Do not overwater.

E. Application: Comply with manufacturer's printed instructions and the following.

1. ARDEX FEATHER FINISH can be installed from a true featheredge up to ½" (12.7 mm) over large areas. It can also be installed up to any thickness in small, well-defined areas.

2. Apply the ARDEX FEATHER FINISH to the substrate with the flat side of a trowel to obtain a solid mechanical bond before applying the desired thickness.

F. Curing:

1. As soon as the ARDEX FEATHER FINISH can be worked on without damaging the surface (15-20 minutes), standard floor coverings such as VCT, sheet vinyl and carpeting can be installed. If installing wood flooring, or, if high-performance adhesives will be used, such as epoxies or urethanes, ARDEX FEATHER FINISH must first cure for 16 hours (70°F).

3.07 PREPARATION FOR FLOORING INSTALLATION

A. Underlayment can accept finish floor covering materials, to include Carpet, after 16 hours at 70°F and 50% relative humidity.

B. The surface of the underlayment shall be checked to ensure that it meets the flooring manufacturer's specifications for flatness before beginning the flooring installation. Areas out of tolerance shall be repaired using the appropriate Ardex underlayment (described herein based upon tolerance discrepancy) as required at the contractors expense.

C. Due to the wide range of adhesives that are used to install floor coverings, some adhesives may dry more quickly over underlayments than over other substrates. If this condition occurs, priming the surface of the underlayment with ARDEX P-51 Primer diluted 1:3 with water will even out the drying of the adhesive. Allow the primer to dry 1-3 hours before proceeding with the adhesive installation.

3.08 FIELD QUALITY CONTROL

A. Where specified, field sampling of the ARDEX underlayment is to be done by taking an entire unopened bag of the product being installed to an independent testing facility to perform compressive strength testing in accordance with ASTM C 109/modified: air-cure only. There are no in situ test procedures for the evaluation of compressive strength.

3.09 PROTECTION

A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

END OF SECTION

DIVISION 04 – MASONRY

SECTION 040100 – MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Provide all labor, materials, and equipment necessary and required to repair and/or replace all existing cracked, chipped, spalled, and loose masonry and tuckpoint existing masonry joints as indicated on the drawings and specified herein.

2. Provide all labor, materials, and equipment necessary and required to clean existing masonry surfaces as indicated on the drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 040120 – Masonry Surface Preparation for Coating
B. Section 042000 – Unit Masonry
C. Section 079200 – Joint Sealants

1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2002.

B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; 2002.

C. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

D. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Brick or other masonry units: Submit manufacturer’s product data, include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

2. Masonry cleaning products: Submit manufacturer's product literature and application instructions demonstrating compliance with specified requirements.

3. Premixed pigmented pointing mortar: Submit manufacturer's product literature and application instructions demonstrating compliance with specified requirements.

4. Components of site-mixed pointing mortar (where mortar type or building age dictate): Submit manufacturer's product literature demonstrating compliance with specified requirements.

5. Flashings, backer rod, sealant, etc: Submit manufacturer's product literature and application instructions demonstrating compliance with specified requirements.

C. Samples:

1. Masonry units: Submit 3 samples of each type of replacement masonry unit.

a. Unit masonry samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.

b. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

2. Colored masonry mortar samples for each color required showing the full range of color which can be expected in the finished work. Label samples to indicate type and amount of colorant used.

3. Site-mixed pointing mortars must be prepared on-site.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Masonry Cleaning:

a. Manufacturer: Regularly engaged in manufacturer of masonry cleaning products with at least 5 completed applications of materials to be provided in this project.

b. Applicator: Experienced with use of masonry cleaning products. Provide documentation of such experience when requested by the Architect.

c. For buildings designated Historic by the NYOPRHP, or those eligible for listing on the National Register of Historic Places, the Contractor is obligated to follow the National Park Service Preservation Brief No. 1, Assessing Cleaning and Water-Repellant Treatments for Historic Masonry Buildings.
https://www.nps.gov/orgs/1739/upload/preservation-brief-01-cleaning-masonry.pdf

d. Low-pressure water washing (below 250 psi) and gentle non-ionic detergents are to be used.

2. Tuckpointing:

a. Tuckpointing work is only to be performed by a qualified and experienced tuckpointing craftsman. Field mock-ups required below are to be prepared by those who will perform the masonry work.

b. Contractor is obligated to follow the National Park Service Preservation Brief No. 2, Repointing Mortar Joints in Historic Masonry Buildings.
https://www.nps.gov/orgs/1739/upload/preservation-brief-02-repointing.pdf

B. Field Samples/Mock-ups:

1. Masonry Repointing: In area selected by Architect, repoint a nine (9) square foot area of brick masonry in accordance with specified requirements for Architect's approval. Obtain Architect's approval of sample area before proceeding with masonry repointing.

a. One field sample/mock-up shall be provided for each of three mortar samples, either pre-mixed, site-mixed, or both, selected by the Architect for a final decision by the Architect and/or Owner. Mock-ups shall be repeated until a satisfactory match is obtained.

b. Prior to pointing, sample area shall first be prepared for review of joint cutting depth and extent. Architect shall be notified when this preparation step is ready for review so it can be approved and process can advance to pointing approvals.

2. Masonry Replacement: In area selected by Architect, replace a nine (9) square foot area of brick masonry in accordance with specified requirements for Architect's approval. Obtain Architect's approval of sample area before proceeding with masonry repointing.

a. One field sample/mock-up shall be provided for each of three brick samples selected by the Architect for a final decision by the Architect and/or Owner. Mock-ups shall be repeated until a satisfactory match is obtained.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:

1. Protect masonry restoration materials during storage against wetting by rain, snow, or ground water, and against soilage or intermixture with other materials.

a. Mortar and grout materials: Store in a dry location or in waterproof containers, tightly closed and away from open flames. Protect liquid components from freezing and comply with manufacturer's recommendations for minimum/maximum temperature requirements.

2. Store all materials in single place approved by Architect, kept clean and neat. Correct damage to storage area and surroundings.

1.07 EXAMINATION OF THE SITE

A. The Contractor shall visit and thoroughly familiarize himself with the site and with the scope of work to be done. He is advised to carefully examine any and all existing conditions which would affect the cost of the required work under the contract and to judge for himself conditions which will exist when he carries out his contract, as he will be entitled to no extra compensation for any work required by field conditions.

B. When the Contractor submits his proposal, it will be interpreted to mean that he has examined the site, fully understands the existing proposed conditions, and he has made due allowances for them in his proposal.

1.08 SITE CONDITIONS

A. Do not lay masonry or stonework, repoint, caulk, wash down or wet surfaces when temperature may drop below 40º F within 24 hours, Follow cold weather procedures as set out in ANSI A41.1 when temperatures may drop below 40º F.

B. Maintain materials and surrounding air temperature to minimum 40º F and maximum 90º F prior to, during and 48 hours after completion of masonry work.

C. Cold Weather Requirements: Comply with recommendations of IMIAWC (CW).

D. Hot Weather Requirements: Comply with IMIAWC Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

E. Mortar:

1. Heat mixing water when air temperature is below 40º F and heat aggregates when temperature is below 32º F to assure mortar temperatures between 40º and 120º F until used.

2. Produce subsequent mortar batches within +/- 10º of first batch.

3. Do not heat water or sand above 120º.

1.09 PROTECTION

A. Protect windows, doorways, trim and other surfaces from damage and immediately remove stains, efflorescence or other unsightly excess resulting from the scope of work.

B. Protect roof membranes and flashings from damage. Lay ½" min. plywood on roof surfaces over full extent of work area and traffic route.

C. Seal existing wall louvers with plastic during the work to reduce infiltration of dust into the building throughout the duration of the scope of work.

1.10 SCAFFOLDING

D. Furnish, install, and maintain safe, OSHA approved scaffolding and/or other staging equipment throughout the duration of the entire project. Safe and compliant work process is the full responsibility of the contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mortar Materials:

1. Portland cement: ASTM C150, Type 1.

a. Type III may be used to reduce protection requirements for laying masonry in cold weather, if approved in advance by Architect.
b. Provide white or gray cement as required to produce required mortar color.

2. Lime: Hydrated, complying with ASTM C207, Type S.

3. Sand: Clean, white washed with 100 percent passing No. 16 sieve and complying with ASTM C144.

4. Mortar color compounds: Inorganic used in proportions recommended by manufacturer, but not exceeding 15 percent of cement weight. Do not exceed 3 percent of cement weight for carbon black.

5. Fine aggregate (for grout): No. 1 sand complying with ASTM C404.

B. Brick Units: Face brick units matching color, texture, and size of existing face brick, and complying with ASTM C216, Type FBX.

C. Acidic cleaner for areas scheduled to receive substantial quantities of brick replacement (effectively "new" brick areas): Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined

with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. "Sure Klean" No. 600 Detergent; ProSoCo, Inc.; or Architect approved equal.

2. Protect areas of existing brick that are not being replaced that may be above, below, and adjacent to the replaced brick from the acidic cleaner.

D. For areas of heavy atmospheric staining, paint oxidation, carbon buildup and other atmospheric pollutants, use:

1. Sure Klean Heavy Duty Restoration Cleaner NE; or Architect approved equal.

2.02 ACCESSORIES

A. Through-Wall Flashing:

1. Copper fabric flashing, 7 oz., asphalt-free (red):

a. York Multi-Flash 500 series York Manufacturing Inc., Sanford, Maine; or Architect approved equal.

2. Provide pre-fabricated stainless steel inside corners, outside corners, and end dams.

3. Termination bar: Product standard of quality is York T-96 termination bar. Manufacturer's standard 1" composite material bar or a 1” 26-gauge stainless steel termination bar with sealant lip.

4. Drip Edge: Stainless-steel with 30-degree 3/8” bent outer edge, hemmed. 3” by 8’.

B. Copper Counter Flashing:

1. 16 oz. soft copper broken to match profile indicated on drawings.

C. Backer Rod:

1. Closed cell foam of diameter required by condition.

D. Caulk:

1. Single component gun-grade urethane sealant.

2.03 MIXES

A. Mortar and Grout - Brick Masonry:

1. Mortar proportions - Type N (by volume) ASTM C270: 1 part Portland cement; 1 part hydrated lime; and 6 parts sand measured in damp, loose condition and constituting not less than 2-1/4-inch not more than 3 times total volume of cement and lime (1:1:4½-6).

2. Grout proportions - Fine Grout (by volume ASTM C476: 1 part Portland cement; 0-1/10 part lime; and same equal to 2-1/4 to 3 times total volume of cement and lime.

3. Mixing: Thoroughly premix Portland cement, hydrated lime, and aggregates; then add water and mix for minimum 5 minutes in mechanical batch mixer.

a. For mortar, add as much water as required for workability. Retemper mortar by adding water and remixing as required for workability, but only within first 2½ hours of pot life.

b. Do not use mortar or grout which has begun to set or which is more than 2-1/2 hours old since initial pre-hydration. Do not add water to retemper old mortar after this point.

B. Do not add air entraining agents or other admixtures to mortar or grout materials specified.

C. Color compounds are to be added in accordance with manufacturer's recommendations.

1. Pre-mixed, pre-bagged colored mortars may be acceptable when submitted for review and approved. Acceptable manufacturers are:

a. Norval
b. Sandell

2. Mortar shall be high in lime content, and softer than existing brick and no harder than existing mortar.

PART 3 - EXECUTION

3.01 REPOINTING

A. Joint Preparation:

1. The contractor shall protect all existing window and door openings and adjacent materials and surfaces from damage during the pointing process. Any damage incurred shall be corrected by the contractor at no additional cost to the owner.

2. With a toothing chisel or pointers grinder, carefully remove all existing deteriorated all joints found to be loose, weak, broken, or structurally defective until firm mortar is reached, but not less than 3/4". Remove joints with the following conditions for spot pointing:

a. Loose or crumbling mortar.
b. Soft and sandy mortar which can be removed without excessive pressure by hand scraping with blunt end of pointing tool.
c. Hollow spaces concealed, or partially concealed by shell of mortar.
d. Joints containing cracks between mortar and masonry where a 34 gauge W & M wire can be inserted 1/2" or more.
e. Where mortar has eroded from the face of the masonry.
f. Where hairline cracks are apparent in the mortar.
g. Where the bond between the masonry and mortar is broken.
h. Where there is plant growth in or around the mortar joint.

3. When documents indicate 100% pointing or "full" pointing of a building face or similar area, the following additional preparation is required:

a. All mortar joints which are sound and do not require repointing due to deterioration shall be partially removed to a uniform depth, minimum ¾" and repointed to match newly pointed joints.
b. Joints which have been previously pointed shall also be partially removed and repointed to match new joints.
c. Remove all mortar joints deteriorated or sound for a project where 100% pointing is indicated.

4. Prior to applying new mortar, clean-out all loose material, debris, and dust.

5. Wet joints before applying new mortar. Allow water to soak into joints, but joints should not be visibly wet with free standing water during repointing.

    a. Architect reserves the right to inspect any and all joints prepared by contractor before proceeding with repointing.

B. Joint Filling:

1. The tuckpointing mortar should be prehydrated to a damp workable consistency which will retain its shape when formed into a ball. Note: Allow mortar to stand in this dampened condition for 1 to 1 1/2 hours.

2. Fill mortar joints in layers not over 1/4" thick, with each layer applied with pressure as soon as previous layer has partially dried. Leave surface of each layer rough; do not tool smooth until final layer is applied.

3. Compress final packing as much as possible to completely fill joint. Compact joints solidly before final tooling.

C. Tooling and Curing:

1. When final mortar layer is thumbprint hard, tool joint to match adjacent existing masonry, or of 100% pointing is required, then tool joints concave. Take care to not spread mortar over edges of brick onto exposed surfaces. Do not feather edge mortar.

2. Following tooling, remove excess mortar from edge of joint.

3. Allow joints to cure for at least 5 days, maintaining in damp condition using water hoses and fine spray mist.

4. The final appearance of the façade shall be uniform in terms of mortar coloration, tooling, and size of joints. Joints shall be tooled to match existing, or where the entire wall is being redone, new joints shall be tooled concave.

5. After completion of pointing work, all loose mortar and mortar staining shall be cleaned from surface of masonry.

3.02 BRICK REMOVAL AND RECONSTRUCTION

A. Removal and replacement (this work is generally to be completed prior to overall pointing):

1. Where the existing bricks units are defective, or are damaged as part of the restoration, cut out the old mortar surrounding the affected units and remove the brick. Chisel out all old mortar and remove all dust and debris, being careful not to allow debris to fall into the cavity. Dampen surrounding brick surfaces and place new unit of similar size and coloration into opening.

B. Defects warranting replacement include, but are not limited to, spalled units, units with subflouresence, previously sandblasted units, units where fired face has weathered off, cracked, and broken units.

1. Support and protect masonry to remain surrounding removal area. Clean edges of masonry to remain by removing mortar, dust, or loose debris.

C. Reconstruction:

1. Install new through-wall flashing where indicated on Drawings or where required by performance of the work in accordance with manufacturer's installation recommendations. Provide full head joint weep holes above flashings at 24” o.c. staggered.

2. Fit replacement masonry units into bonding and coursing pattern of existing masonry. Lay units with completely filled bed, head, and collar joints. Butter ends sufficiently to fill head joints and shove into place. Maintain joint width to match existing masonry and tool to match existing masonry, or concave if a full area project.

3. Use motor-driven saw/grinder designed to cut masonry with clean, sharp, unchipped edges where cutting is required.

D. Sawcutting of new control/expansion joints:

1. At locations indicated on the Drawings, sawcut a ½” wide joint the full height of the wall area and fully through the depth of the brick or veneer wythe. Provide backer rod and caulking full height.

E. Tooling and Curing:

1. Joint filling, tooling, and curing shall be the same as described under 3.01.C.

3.03 FLASHING OF MASONRY WORK

A. General: Provide concealed flashing in masonry work at or above shelf angles, lintels, ledges, and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and cut back flush after mortar has cured.

1. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work where inner wythes can be disturbed by the work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.

2. Where new flashings are installed in a solid wall construction (often pre 1950s), terminate to inner course with a continuous termination bar sealed at the top edge in best condition to prevent passage of moisture beyond line of flashing.

3. Where new flashings are installed in a “Larsen System” type wall (often 1950s to early 1960s consisting of CMU backup with brick headers and staggered flashings), attempt to lift higher layer of existing flashing and install new flashing below, positively lapping and sealing existing flashing to new. If this is not possible, then provide continuous termination bar and sealant above to existing backup condition.

4. Where new flashings are installed in a cavity-type construction (often mid-1960s to present), provide continuous termination bar to backup masonry and seal top edge.

5. Interlock end joints of flashings not less than 1-1/2" and seal lap with compatible sealant or flashing cement.

6. Install flashing to comply with manufacturer's instructions.

7. Provide full open head joint weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space weep holes at 24" o.c. unless otherwise indicated.

8. Install reglets and nailers for counter flashing and other related work where shown to be built into masonry work, or install counterflashing below through wall flashing to maintain positive drainage flow.

3.04 REMOVAL AND REPLACEMENT OF CONTROL/EXPANSION JOINT CAULKING AND CAULKING OF NEW JOINTS

A. Where control and/or expansion joints exist within the areas of masonry work that are being reconstructed, remove existing joint filler material and provide new foam backer rod and caulking for the full extent of the joint. This shall be done in coordination with pointing but before cleaning unless cleaners are not compatible with the caulking proposed. If incompatible, then perform caulking after cleaning.

B. Where new control and/or expansion joints are indicated, coordinate with the work of 3.01 and 3.02.

3.05 POST-CONSTRUCTION DETERGENT CLEANING

A. Final Cleaning: After mortar is thoroughly sets and cured, clean masonry with detergent as follows:

1. Cleaners shall be applied and removed in accordance with manufacturer’s instructions.

2. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

3. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

4. Protect non-masonry surfaces (adjacent windows, doors, panel systems, etc.) from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

5. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

6. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner where indicated on the drawings.

7. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins. Restoration cleaners indicated herein are not suitable for use on concrete masonry.

8. Clean limestone units to comply with recommendations in "ILI Handbook" published by Indiana Limestone Institute of America.

B. Where detergent is determined to be too harsh or otherwise unsuitable for cleaning, then clean according to 3.06 below.

3.06 POST-CONSTRUCTION MECHANICAL AND WATER CLEANING

A. Remove excess mortar, sealant, or other material from face of masonry as repointing or masonry

rebuilding progresses.

B. Allow completed restoration to cure for approximately 30 days, then thoroughly clean exposed masonry surfaces with stiff nylon bristle brushes and clean water under normal pressure.

C. Do not use metal scrapers or metal brushes.

1. Do not use acid or alkali cleaning agents.

3.07 PROTECTION

A. Provide protection of work and maintain protective conditions in a manner acceptable to the Owner, which ensures the work will be without damage or deterioration to the time of substantial completion.

END OF SECTION

DIVISION 04 – MASONRY

SECTION 040120 – MASONRY SURFACE PREPARATION FOR COATING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this Section of the Specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this Section and other related work in connection with cleaning and preparation of masonry surfaces to provide a clean, contamination-free surface suitable for the application of permanent coatings.

1. The Contractor shall remove all water, dirt, paint, grease, oils, loose materials, and previous coatings from the surfaces to be coated to the satisfaction of the coating manufacturer and the Architect.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.03 RELATED SECTIONS

A. Section 030130.11 – Cementitious Concrete Finish Coating
B. Section 030130.12 – Elastomeric Concrete Finish Coating
C. Section 030130.13 – Acrylic Concrete Finish Coating
D. Section 040100 – Masonry Restoration and Cleaning
E. Section 042000 – Unit Masonry

1.04 APPLICABLE STANDARDS

A. ASTM Standards:

D4261 Standard practice for surface cleaning concrete masonry units for coating.

D4285 Test method for indicating oil or water in compressed air.

1.05 SUBMITTALS

A. Submittals shall be in accordance with Section 01300 – Submittal Procedures and as modified below.

B. The Contractor shall submit the cleaning procedure, in accordance with this specification, outlining methods, equipment and materials to be used for cleaning of masonry to the Architect for approval prior to the commencement of work.

C. Submit manufacturer’s data for products including application instructions.

D. Contractor shall perform full cleaning procedure on a selected sample area to verify acceptability prior to proceeding with full scope of cleaning.

PART 2 - PRODUCTS
(NOT USED)

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

A. Steam Cleaning: Remove heavy deposits of grease and oil as well as other water-soluble surface contaminants and emulsifiable materials with low-pressure steam in accordance with ASTM D4258.

B. Detergent water cleaning may be performed in lieu of steam cleaning provided the contractor demonstrates that the proposed product(s) and procedure yields similar results to steam cleaning that are acceptable to the Architect.

1. Detergent water cleaning shall consist of scraping of heavy deposits of dirt, grease or oil and cleaning the surface with a stiff-bristled brush using an aqueous solution of detergent or non-solvent emulsifier. Immediately after treatment, before the surface dries, residues of the cleaning agent shall be removed by thoroughly flushing the surface with clean potable water.

2. Prior to detergent water washing, provisions must be made for the collection and removal of waste wash water and contaminates generated by this cleaning method.

3. The use of acids for cleaning or preparing surfaces is not permitted.

C. Correct fins and protruding irregularities by mechanical means.

3.02 ABRASIVE BLAST CLEANING:

A. Abrasive blast cleaning is required when the Surface Preparation above is alone insufficient to provide a clean, acceptable surface for coating or if abrasive blasting, sand blasting, or shot blasting is specifically required by the Drawings or other specification sections. In any case, all costs associated with abrasive blast cleaning shall be borne by the contractor and included in the bid.

B. Clean masonry surfaces in accordance with Surface Preparation section above.

C. Erect temporary containment barriers suitable to the project to capture all spent blast media and particulate matter.

1. The Contractor shall be fully responsible for any and all contamination to adjacent properties and shall clean and make all necessary repairs to same at no expense to the Owner.

D. Masonry surface may be wet or dry as appropriate to the type of equipment to be used.

E. Apparatus: Typical methods are wet or dry open blast cleaning with nozzles and self-contained recirculating blast cleaning apparatus.

1. The compressor shall supply a minimum pressure, in the hose, of 620 KPa within 36” of the nozzle.

2. The air stream used for nozzle blast cleaning shall be free of oil, verified using ASTM Test Method d4285.

3. Nozzles shall be a minimum of diameter of 8mm.

4. Hoses shall be a minimum inside diameter of 40mm.

5. Abrasives shall be metallic, garnet, or resin-coated silica sand. Uncoated silica sand is

specifically disallowed.

F. The intent is to remove sufficient material in order to achieve a sound masonry surface free of existing coatings, laitance, glaze, efflorescence, and incompatible compounds or agents.

3.03 POWERWASHING

A. Low-pressure powerwashing may be performed in lieu of abrasive blasting provided the contractor demonstrates the proposed procedure yields similar results to abrasive blasting that are acceptable to the coating manufacturer and the architect.

B. Clean masonry surfaces in accordance with Surface Preparation section above.

C. Apparatus shall be a piston-type positive displacement pump, low-pressure water blasting unit.

3.04 APPEARANCE OF PREPARED MASONRY SURFACE

A. Masonry surface shall have a minimally roughened texture. A roughness standard shall be established by mutual agreement between the Architect and Contractor.

B. Bug holes shall be opened.

C. Post-preparation cleaning: Clean in accordance with ASTM D4258 to remove loose material.

3.05 INSPECTION

A. Visually examine the prepared surface for loose adhering material, thin crusts bridging voids, fins, and projections.

B. Visually examine the prepared surface for paint, oil, grease, and markings.

C. Repeat appropriate cleaning and preparation processes if the above conditions are found.

3.06 ACCEPTANCE

A. Acceptable surface shall be free of paint, laitance, oil, grease, and other materials incompatible with the coating. The surface shall also be free of fins, projects, and loosely adhering, concrete, dirt, and dust particles.

B. The surface shall have a smoothed, textured appearance, roughened only where unavoidable. Bug holes shall be opened.

C. The resulting surface condition must allow the coating manufacturer to provide acceptance in writing. Cleaning, abrasive blasting and/or powerwashing must be repeated as required to obtain acceptance.

D. The final appearance shall be similar to the standard established by mutual agreement between the Architect and the Contractor upon review and acceptance of the sample panel cleaned under 1.05.D.

END OF SECTION

DIVISION 04 – MASONRY

SECTION 042000 – UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK / SUMMARY

A. Extent of each type of masonry work is indicated on drawings and schedule.

B. This Section includes unit masonry assemblies consisting of the following:

1. Concrete unit masonry.
2. Brick masonry.
3. Decorative concrete masonry units.
4. Pre-faced concrete masonry units.
5. Natural stone.
6. Concrete brick.
7. Mortar and grout.
8. Reinforcing steel.
9. Masonry joint reinforcement.
10. Ties and anchors.
11. Miscellaneous masonry accessories.

1.03 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete
B. Section 051200 – Structural Steel
C. Section 061000 – Rough Carpentry
D. Section 072100 – Building Insulation
E. Section 072113 – Ultra Wall Insulation and Air Barrier System Air / Vapor Barrier System
F. Section 076000 – Flashing and Sheet Metal
G. Section 079200 – Joint Sealants
H. Section 081113 – Hollow Metal Doors and Frames
I. Section 081416 – Flush Wood Doors
J. Section 084113 – Aluminum Entrances and Storefronts
K. Section 083600 – Sectional Overhead Doors
L. Section 085113 – Aluminum Windows

1.04 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2002.

B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; 2002.

C. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

D. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

1.05 DEFINITIONS

A. Reinforced Masonry: Masonry containing horizontal joint reinforcing and reinforcing steel in grouted cells.

B. Multi-Wythe Masonry: Masonry wall construction containing adjacent wythes of masonry with the same unit type without a cavity.

C. Composite Masonry: Masonry wall construction containing adjacent wythes of masonry with different unit type without a cavity.

D. Cavity Wall Masonry: Masonry wall construction containing adjacent wythes of masonry with different unit types separated with a continuous air space cavity in-between connected by metal ties.

E. Structural Masonry: Masonry wall construction constructed to be the main supporting structure of other building components such as a floor or roof.

1.06 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.

B. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.07 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

C. Shop Drawings: Submit shop drawings for the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement". Show elevations of reinforced walls.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
5. Self-Adhering Sheet Flashing & Waterproofing Membranes: Detail all proposed application conditions, Submit manufacturer's data for membrane, primers, sealants, adhesives and associated auxiliary materials. Prior to commencing the Work, submit manufacturer's complete set of standard details for waterproofing systems.

D. Samples: Submit samples of the following materials:

1. Unit masonry samples in small scale form showing full extent of colors and textures available for each type of exposed masonry unit required.

2. Face brick, in the form of straps of five or more bricks. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

3. Colored masonry mortar samples showing full extent of colors available.

4. Decorative concrete masonry unit samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.

5. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

6. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used. Show full extent of colors available.

7. Weep vents in color to match mortar color.

8. Accessories embedded in masonry.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and submission of materials in accordance with this section have been provided for review by the Architect and approved in writing.

F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units. Include material test reports substantiating compliance with requirements.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

G. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports, per ASTM C 780, for mortar mixes required to comply with properties specification.

2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

H. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

I. Cold-Weather Procedures: Submit a detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

D. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance ratings have been determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

E. Field Constructed Mock-ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made under sample submittals to demonstrate aesthetic effects and set quality standards for materials and execution, as well as for color and textural characteristics of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials, and construction; build mock-ups to comply with the following requirements:

1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by the Architect.

2. Build mock-ups for each type of exposed masonry in sizes of approximately 6' long by 4' high by full thickness, including face and back-up wythes as well as all accessories including but not limited to insulation and horizontal and vertical reinforcement.

3. Include a sealant-filled joint at least 16 inches long in exterior wall mockups.

4. Include through-wall flashing; with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).

5. Include metal/wood studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup, when applicable.

6. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.

7. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.

8. Approval of mockups is for construction of full assembly, color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

9. Protect mock-ups from the elements with weather resistant membrane.

10. Retain mock-ups during construction as standard for judging completed masonry work. When directed, demolish mock-ups and remove from site.

11. Pre-installation Conference to be after construction of mock-up but before proceeding with masonry work. Conduct pre-installation conference at Project Site.

F. Qualifications:

1. Masonry Cleaning:

a. Manufacturer: Regularly engaged in manufacturer of masonry cleaning products with at least 5 completed applications of materials to be provided in this project.

b. Applicator: Experienced with use of masonry cleaning products. Provide documentation of such experience when requested by the Architect.

c. For buildings designated Historic by the NYOPRHP, or those eligible for listing on the National Register of Historic Places, the Contractor is obligated to follow the National Park Service Preservation Brief No. 1, Assessing Cleaning and Water-Repellant Treatments for Historic Masonry Buildings.
https://www.nps.gov/orgs/1739/upload/preservation-brief-01-cleaning-masonry.pdf

d. Low-pressure water washing (below 250 psi) and gentle non-ionic detergents are to be used.

2. Tuckpointing:

a. Tuckpointing work is only to be performed by a qualified and experienced tuckpointing craftsman. Field mock-ups required below are to be prepared by those who will perform the masonry work.

b. Contractor is obligated to follow the National Park Service Preservation Brief No. 2, Repointing Mortar Joints in Historic Masonry Buildings.
https://www.nps.gov/orgs/1739/upload/preservation-brief-02-repointing.pdf

1.09 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Payment for these services will be made by Owner.

2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

3. Refer to Specification Sections 014523 & 014529 for additional Special Inspection requirements.

C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials and accessories to project in undamaged condition.

B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, or other causes.

C. Store masonry units and cementitious material off the ground, on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units become wet, do not install until they are dry. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

F. Cold-applied elastomeric membranes should be stored in closed containers outdoors. Store membrane at temperature of 40°F and above to facilitate handling. Membrane contains petroleum solvents and are flammable; do not use near open flame. Store roll materials horizontally; store adhesives and primers at temperatures of 40°F and above to facilitate handling. Keep all solvents away from open flame or excessive heat.

1.11 PROJECT CONDITIONS

A. Protection of Work: During construction, cover top of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

3. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

4. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

B. Stain Prevention: Prevent grout, mortar, or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings and wash down detergent.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold Weather Requirements:

1. Do not lay masonry units which are wet or frozen. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.

2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

3. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and Chapter 21 of the Building Code of New York State, latest edition.

D. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40°F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and Chapter 21 of the Building Code of New York State, latest edition.

F. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at the time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10°F (6°C).

1. 40°F (4°C) to 32°F (0°C):

   a. Mortar: Heat mixing water to produce mortar temperature between 40°F (4°C) and 120°F (49°C).
   b. Grout: Follow normal masonry procedures.

2. Do not heat water for mortar and grout to above 160°F (71°C).

G. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40°F (4°C) to 32°F (0°C):

   a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32°F (0°C) to 25°F (-4°C):

   a. Completely cover masonry with weather-resistive membrane for at least 24 hours.

3. 25°F (-4°C) to 20°F (-7°C):

   a. Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

4. 20°F (-7°C) and below:

   a. Except as otherwise indicated, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.

H. Coordination: Ensure installation continuity of the waterproofing membranes scheduled for

installation throughout the scope of this section. Work shall be so scheduled as to provide a watertight seal at the end of each working day on the areas worked upon during the day.

PART 2 - PRODUCTS

2.01 GENERAL

A. All specific products indicated within this section are to establish a level of quality. Equivalency is permitted in accordance with General Municipal Law per the Architect's determination to be considered an Approved Equal.

2.02 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.03 CONCRETE MASONRY UNITS (CMU)

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

B. Concrete Block: Provide units complying with characteristics indicated below for grade, type, face size, exposed face, and, under each form of block included, for weight classification.

1. Size: Manufacturer's standard units with nominal face dimensions and thicknesses indicated on drawings.

2. Type II, non-moisture controlled units.

C. Hollow Load-Bearing Block: ASTM C 90 and as follows:

1. Weight Classification: Lightweight

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.

3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

4. All components (aggregate, cement, etc.) of CMU must be harvested within 500 miles of project site. (Required for LEED Projects only)

5. CMU to contain 20% post-industrial recycled content, by weight. (Required for LEED Projects only)

D. Concrete Building Brick: ASTM C 55.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2500 psi.

2. Weight Classification: Medium weight.

3. Size (Actual Dimensions): 3-5/8 inches wide by 3-5/8 inches high by 7-5/8 inches long.

E. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2. **All interior outside corners of CMUs shall have a 5/8" to 1" manufactured bullnosed edge. This requirement supercedes any details which may or may not be provided in the Contract Documents. All masonry bids shall include the cost of all necessary bullnose materials, at no additional costs to the Owner.**

2.04 VENEER BLOCK

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

2. Provide square-edged units for outside corners, except where indicated as bullnose.

3. Provide corner units where applicable and available.

B. Concrete Block: Provide units complying with characteristics indicated below for grade, type, face size, exposed face, and, under each form of block included, for weight classification.

1. Types included but not limited to the following:

a. Split-face
b. Split-face center score
c. Smooth-cast
d. Split Rib
e. Or as indicated on the drawings.

C. Size: Manufacturer's standard units with nominal face dimensions of 16" or 18” long x 8" high x 4" thick (15-5/8" or 17-5/8” x 7-5/8" x 3-5/8” actual).

D. Type I, moisture-controlled units.

E. Exposed Faces: Manufacturer's standard color and texture as selected by Architect unless otherwise indicated.

1. Where special finishes are indicated, provide units with exposed faces of the following general description matching color and texture of Architect's samples.

2. Where special patterns are indicated, provide units with exposed faces matching color, texture, and pattern of Architect's samples.

2.05 BRICK MADE FROM CLAY OR SHALE

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.

1. Size: Provide bricks manufactured to the following actual dimensions:

a. Standard Modular: 2-1/4" x 3-5/8" x 7-5/8".
b. Or as indicated on the drawings.

2. Provide special molded shapes where indicated and for application requiring brick of form, size, and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.

3. For sills, caps, and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

B. Facing Brick: ASTM C 216, and as follows:

1. Grade SW.

2. Type FBS (normal size and color variations).

3. Compressive Strength: 4,500 psi, minimum, per ASTM C 67.

4. Application: Use where brick is exposed, unless otherwise indicated.

5. Texture and Color: As indicated on drawings or as selected by Architect.

C. Building (Common Brick): ASTM C 62, and as follows:

1. Grade MW except Grade SW where indicated by ASTM C 62 grade requirements for applicable weathering index and exposure.

2. Application: Use where brick is indicated for concealed locations.

2.06 FIRE BRICK MASONRY

A. General: Comply with referenced standards and other requirements indicated below applicable to each form.

B. Fire Brick: Provide units complying with characteristics indicated below for classification, P.C.E. rating, chemical percentage analysis, modulus of rupture, cold crushing P.S.I., porosity % and bulk density.

1. Classification: ASTM C-27-98 (2013), medium duty.
2. P.C.E.: Cone 29 3018 F.
3. Chemical Analysis:

    a. Silca: 59.90
    b. Alumina: 32.83
    c. Iron Oxide: 1.97
    d. Titanium Oxide: 1.48
    e. Calcium Oxide: .57
    f. Magnesium Oxide: .89
    g. Sodium Oxide: .49
    h. Potassium Oxide: 1.80

4. Modulus of Rupture: 1000–1200 PSI
5. Cold Crushing: 3500-4500 PSI
6. Apparent Porosity: 16-19%
7. Bulk Density: 130-134 lbs/ft
8. Method of Manufacturer: Dry Press

2.07 MORTAR AND GROUT MATERIALS

A. General: Do not use admixtures, including coloring pigments, air entraining agents, accelerators, retarders, water repellant agents, anti-freeze compounds, or other admixtures unless otherwise indicated and approved by Architect.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cement and lime.
3. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
5. All new face brick mortars shall match existing face brick mortars where restoration work is required, samples of which shall be prepared and thoroughly tested for color, density, and uniformity before submitting samples for the approval of the Architect.

B. Option 1 – Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to project site.

C. Option 2 – Manual Blend: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

D. Mortar for Unit Masonry: Comply with ASTM C 270, “Standard Specification for Mortar for Unit”, Masonry Proportion Specification, for types of mortar required unless otherwise indicated.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced CMU masonry, use Type S.
3. For brick masonry walls above grade, use Type N.
4. For exterior, above-grade, load-bearing and non-load-bearing CMU walls and parapet walls; for interior load-bearing CMU walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
5. Analysis of the existing mortar to remain is required within the contract if the type required is not clear.

E. Portland Cement: ASTM C 150, “Standard Specification for Portland Cement”, Type I, except Type III, may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.

1. For colored pigmented mortars, use premixed colored masonry cements of formulation required to produce color indicated, or, if not indicated, as selected from manufacturer's standard formulations by Architect.
2. Available Products: Subject to compliance with requirements, masonry cements which may be incorporated in the work include, but are not limited to, the following:

    a. "Lehigh & Flamingo Custom Color Masonry Cement"; Lehigh Portland Cement Company.
    b. "Custom Color Masonry Cement"; Spec Mix, LLC.
    c. “Glen-Gery Color Mortar Blend”; Glen–Gery Corporation.

F. For Manually Blended Colored Mortar Use Colored Mortar Pigments (for use with veneer brick and veneer block): Use pigments complying with ASTM C979, “Standard Specification for Pigments for Integrally Colored Concrete”. Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment to cement ratio of 1 to 10 by weight. Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

1. Available Products: Subject to compliance with requirements, colored mortar pigments which may be incorporated in the work include, but are not limited to, the following:

    a. "SGS Mortar Colors", Solomon Colors, Inc.
    b. "Canister Colors"; Spec Mix, LLC.
    c. "True Tone Mortar Colors"; Davis Colors.
    d. "Bayferrox Iron Oxide Pigments"; Bayer Corporation, Industrial Chemical Division.

G. Water: Clean and potable.

H. Hydrated Lime: ASTM C 207, "Standard Specification for Hydrated Lime for Masonry Purposes", Type S.

I. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

J. Aggregate for Mortar: ASTM C 144, "Standard Specification for Aggregates for Masonry Mortar".

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

2. For joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

3. White-Mortar Aggregates: Natural white sand or crushed white stone.

K. Aggregate for Grout: ASTM C 404, "Standard Specification for Aggregates for Masonry Grout".

L. Grout for Unit Masonry: Comply with ASTM C 476, "Standard Specification for Grout for Masonry", for grout for use in construction of reinforced and non-reinforced unit masonry. (Refer to Table 1 Conventional Grout Proportions by Volume. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

TABLE 1 Conventional Grout Proportions by Volume

Type	Parts by Volume of Portland Cement or Blended Cement	Parts by Volume of Hydrated Lime or Lime Putty	Aggregate, Measured in a Damp, Loose Condition	
			Fine	Coarse
Fine grout	1	0–1⁄10	2-1⁄4 –3 times the sum of the volumes of the cementitious materials	. . .
Coarse grout	1	0–1⁄10	2-1⁄4 –3 times the sum of the volumes of the cementitious materials	1–2 times the sum of the volumes of the cementitious materials

1. Use fine grout in grout spaces less than 2" in horizontal direction unless otherwise indicated.
2. Use coarse grout in grout spaces 2" or more in least horizontal dimension unless otherwise indicated.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.
4. The compressive strength of the grout shall match the compressive strength of the masonry f'm, but not less than 2,000 psi. The compressive strength of grout so specified should be determined according to ASTM C1019 (UBC 21-18).

M. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Available Products:

a. Euclid Chemical Compnay; Accelguard 80.
b. Grace Construction Products, a unit of W.R. Grace & Co., Morset.
c. Sonneborn, division of ChemRex; Trimix-NCA.

2.08 FIRE WALLS

A. General: Comply with the referenced standards and other requirements indicated below as applicable to each type of fire wall construction required.

B. Provide masonry units and construction as required by Underwriter's Laboratories, Inc.; Design as indicated on the Contract Drawings.

1. If no specific designs are represented on the drawings, the following designs shall be utilized:
a. 3-Hour Firewall – UL Design No. U904.
b. 2-Hour Firewall – UL Design No. U905 or UL Design No. U906.

C. Provide complete fire wall assembly submittals independent of typical masonry submittals.

1. Only eligible manufacturers with products bearing the UL mark will be accepted for use in the construction of fire walls.

2.09 JOINT REINFORCEMENT, TIES, AND ANCHORING DEVICES

A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie, and anchor for size and other characteristics.

1. Zinc-Coated (mill galvanized) Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 641 for zinc coating of class indicated below:

a. Class 1: 0.40 oz. per square foot of wire surface.
b. Application: Use for masonry not exposed to exterior or earth.

2. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153 for zinc coating applied after prefabrication into units.

a. Class B-2: 1.5 oz. per square foot of wire surface.
b. Application: Use for all masonry back-up exposed to exterior.

3. Uncoated Steel Reinforcing Bars: Of size and locations as indicated on drawings, ASTM A615, Grade 60, deformed.

4. Stainless Steel Reinforcing Bars: AISI Type 304, ASTM A580, for historical masonry reconstruction projects.

B. Joint Reinforcement: Reinforcement to conform to Standard Specification ASTM A951 & ACI/ASCE 530 (Building Code Requirements for Masonry Structures). Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal

width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.

2. Wire (Carbon Steel): Pre-fabricated construction from cold-drawn steel wire conforming to ASTM A 82:

   a. Tensile Strength: 80,000 psi.
   b. Yield Point: 70,000 psi, minimum.

3. Wire Diameter for Cross & Side Rods: Provide standard weight 9 gauge (.148”), typical.

C. Single-Wythe Masonry: Provide type as follows with single pair of side rods:

1. Provide Hohmann & Barnard, Inc. **#220 Ladder Mesh Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c.

2. Finish: Provide mill galvanized, per ASTM A 641.

D. Multi-Wythe Masonry: Provide type as follows:

1. Provide Hohmann & Barnard, Inc. **#120 Ladder Mesh Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c.

2. Finish: Provide mill galvanized, per ASTM A 641.

E. Masonry Joint Reinforcement for Cavity-Wall Masonry:

1. Provide Hohmann & Barnard, Inc. **# 270-ML Ladder Adjustable Eye-Wire Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c., Cross rods to be welded at 16” o.c; first cross rods to be welded 12” in from each end to allow for lap splices.

2. Finish: Provide hot-dip galvanized, after fabrication, per ASTM A 153.

F. Steel Stud Masonry Anchor System: (Where required) Provide **X-Seal Anchor System with Byna-Lock Wire Ties**, as manufactured by *Hohmann & Barnard, Inc.*, 30 Rasons Court, Hauppauge, New York, 11788; tel (800) 645-0616; fax (631) 234-0683. website: www.h-b.com.

G. Reinforce each course of block cut back for fire extinguisher cabinets, electrical boxes and toilet accessory type recessed items. Mortar 9 gauge reinforcing wire in joints, that is 24-inches longer than recessed opening width on both sides.

H. All steel reinforcement to contain minimum 90 percent combined post-consumer and post-industrial recycled content. (Required for LEED Projects only)

2.10 TIES AND ANCHORS

A. Materials: Provide ties, reinforcing and anchors, specified in subsequent articles, made from materials that comply with this article, unless otherwise indicated.

1. Carbon Steel Wire: ASTM A 82.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
3. Products meeting specified products quantities by Hohmann & Barnard, Inc. or Heckmann Building Products Inc.
4. Anchors and ties shall be 16 inches on center each way.
5. Horizontal reinforcing shall be 16 inches on center.

B. Joint Stabilizing Anchors: Provide Hohmann & Barnard, Inc., **Slip-Set™ Stabilizer** joint stabilizing anchors at veneer control joints and block interior wall, running wall, corner, "Tee", and "Ell" joints.

1. Provide joint stabilizing anchors at connection of new masonry to existing masonry or concrete walls.

2. Refer to Structural Drawings for additional requirements.

C. Rigid Anchors: Provide Hohmann & Barnard, Inc., #**344 - Rigid Partition Anchor,** Z-Type bent steel shape 1-1/2 inches wide by 1/4 inch thick by 24 inches long or length required, with ends turned up 2 inches or with cross pins. (Rigid anchors can be used to connect T-intersections of CMU shear walls in lieu of masonry bonding or bond beams. (Used at T-intersections of other CMU walls and piers where indicated on drawings, although masonry bonding and T-shaped masonry joint reinforcement may be used.)

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M. (Rigid anchors may not be fully embedded in mortar or grout and, therefore, require a coating for corrosion protection.)

D. Mesh Wall Ties: Provide Hohmann & Barnard, Inc., **MWT - Mesh Wall Tie,** ½" square x 16-gauge, by width & length required; hot dip galvanized to ASTM A153 B2 finish.

E. Corrugated Wall Ties: Provide Hohmann & Barnard, Inc., **CWT – Corrugated Wall Tie,** 7" long x 16-gauge, or length as required; hot dip galvanized to ASTM A153 B2 finish.

F. Beam Strap Anchors: Provide Hohmann & Barnard, Inc., **#364 Corrugated Gripstay Anchor** 1-1/4 inch x 14 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish.

G. Breakaway Fire Wall Anchors: Provide Heckmann Building Products, **#134 Channel Slot Corrugated Anchor** for masonry to structural steel beams and **#196 Corrugated Notch Column Anchor** for masonry to structural steel columns, 1-1/4 inch x 16 gauge, by length required; Zinc Alloy 710.

H. Masonry Column Anchors: Provide Hohmann & Barnard, Inc., #**356L - Column Anchor,** 1-1/4 inch x 12 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish or Hohmann & Barnard, Inc., #**355L - Column Anchor,** 1-1/4 inch x 12 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish.

I. Partition Top Anchors: Provide Hohmann & Barnard, Inc., **PTA Series Anchors - PTA 422,** 12-gauge steel plate; hot dip galvanized to ASTM A153 B2 finish.

J. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Provide Hohmann & Barnard, Inc., **HB-200/DA-213 Adjustable Veneer Anchor,** with two stainless steel fasteners #12 diameter each.

2.11 MISCELLANEOUS ANCHORS

A. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex

nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

B. Wedge Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1923A, Type 4. Anchors shall be non-bottom bearing type with a single piece steel expansion clip providing 360-degree contact with the base material and shall not require oversized holes for installation. Carbon steel anchors shall have an electroplated zinc finish or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Stainless steel anchors shall be type 303, 304 or 316. Anchors shall have an evaluation report issued by ICC-ES and have been tested in accordance with ICC-ES AC01 for all mandatory tests and including the following:

1. Seismic tension & shear
2. Combination of tension and shear loads
3. Critical and minimum edge distance

Unless otherwise noted, wedge anchors shall be **"Wedge-All" Wedge Anchors** by Simpson Strong-Tie (ICC-ES ESR-1396).

C. Sleeve Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1922A. Anchors shall be non-bottom bearing type with a single piece steel expansion sleeve providing 360-degree contact with the base material and shall not require oversized holes for installation. Carbon steel anchors shall have an electroplated zinc finish. Stainless steel anchors shall be type 304. Anchors shall have been tested in accordance with ICC-ES AC01 for the following:

1. Static Loads
2. Critical and minimum edge distance and spacing

Unless otherwise noted, sleeve anchors shall be **"Sleeve-All" Sleeve Anchors** by Simpson Strong-Tie.

D. Postinstalled Veneer Anchors For Reconstruction Work: Provide chemical anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.12 CONCEALED FLASHING MATERIALS

A. Thru Wall Flashing Membrane (where so noted on the drawings):

1. Through-wall Flashing Membrane (Self-Adhering) shall be **Blueskin® TWF**, an SBS modified bitumen, self-adhering sheet membrane complete with a yellow engineered thermoplastic film; as manufactured by Henry Company, 909 North Sepulveda Blvd. Suite 650, El Segundo, CA, 90245; tel. (800) 598-7663; email: techservices@henry.com. Provide pre-fabricated inside & outside corners and end dams mitered and fully adhered, including **Stainless Steel 3" Drip Plate** and all required bonding accessories as standard to Base Bid. Provide pre-formed drip plate inside and outside corners with smooth uninterrupted hemmed drip edge.

Membrane shall have the following physical properties:

a. Membrane Thickness: 0.0394 inches (40 mils),

b. Film Thickness: 4.0 mils,
c. Flow (ASTM D5147): Pass @ 212 degrees F,
d. Puncture Resistance: 134 lbf to ASTM E 154,
e. Tensile Strength (film): 5000 psi minimum ASTM D 882,
f. Tear Resistance: 45lbs.-MD, 17lbs.-CD to ASTM D1004,
g. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M

B. Sheet Metal Counter Flashing (where so noted on the drawings): Fabricated from the following metal complying with requirements specified in Division 7 Section "Flashing and Sheet Metal" and below:

1. Copper: 7 oz. weight copper fabric flashing; asphalt-free (red) York Multi-Flash 500 series as manufactured by York Manufacturing Inc., for fully concealed flashing, and 16 oz. weight copper for cap flashing. Provide copper flashing where sloped glazing occurs.

2. At parapet cap stones use 16 oz. copper dove-tail flashing manufactured by Cheney Flashing Company.

3. Fabricate through-wall metal flashings with deformation in both directions for integral mechanical mortar bond.

4. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section - 076000 "Flashing and Sheet Metal".

2.13 TRANSITION MEMBRANES

A. Primary sheet air/vapor barrier membrane shall be **Blueskin® SA**, an SBS modified bitumen, self-adhering sheet membrane complete with a blue engineered thermoplastic film; as manufactured by Henry Company, 909 North Sepulveda Blvd. Suite 650, El Segundo, CA, 90245; tel. (800) 598-7663; email: techservices@henry.com.

B. Primer: Primer for self-adhering membranes at temperatures above 25°F shall be Aquatac™ Primer manufactured by Henry, a polymer emulsion based adhesive, quick setting, having the following physical properties:

1. Color: Aqua.
2. Weight: 8.7 lbs/gal.
3. Solids by weight: 53%.
4. Water based, no solvent odors.
5. Drying time (initial set): 30 minutes at 50% RH and 70°F.

2.14 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Preformed Control Joint Strips: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Control Joint Block Shear Connector: Provide sash block either side of control joint and insert

Hohmann & Barnard, Inc. **RS Series - Rubber Control Joint** in joint full height.

E. Control Joint Foam (Mortar Excluding) Filler: Provide Hohmann & Barnard, Inc., **NS - Closed Cell Neoprene Sponge** expansion joint in veneer control joints held back for bond breaker and sealant. Apply sealant at cavity face of block prior to applying vapor barrier to make building airtight.

1. Compressible Control Joint Foam Filler: Provide Hohmann & Barnard, Inc., **NS - Closed Cell Neoprene Sponge** with adhesive backing under shelf angles to allow for vertical veneer movement. Hold back for sealant and bond breaker.

F. Weepholes: Provide the following for weepholes:

1. Full Head Joint Weep Holes: Provide a full height **open** cell weep hole at base of wall above flashing and above steel lintels provided with thru-wall flashing.

2. Weep Vents (Top of Wall): Available Products; subject to compliance with requirements, weephole/ventilators which shall be incorporated in the work include, but are not limited to, the following:

a. "Hohmann and Barnard" No. 343, No. 343W Louvered Weep Hole. For use with Standard white and grey mortar.
b. "Hohmann and Barnard" No. QV-Quadrovent. For use with colored mortars. Color as selected by Architect.

G. Cavity Drainage Material: Free-draining mesh, made from high density polyethylene strands (1" x 10" x 60") that will not degrade within the wall cavity; 90% open mesh weave.

1. Provide the following configuration:

a. Strips, full-depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.

2. Products:

a. Mortar Net USA, Ltd.; "Mortar Net"
b. Hohmann and Barnard; "Mortar Trap"

H. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

1. Available Products:

a. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.15 INSULATION

A. Cavity wall closed cell expanded polystyrene insulation as indicated on drawings and specified in related sections. Refer to Specification Section 072113. Thickness as indicated on drawings.

1. Cavity wall assembly will utilize continuous rigid board cavity insulation adhered to CMU with all joints and penetrations sealed with spray foam sealant.

2.16 MASONRY CLEANERS

A. Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. Available Products: Subject to compliance with requirements, a product which may be used to clean unit masonry surfaces includes, but is not limited to, the following:

a. "Sure Klean" No. 600 Detergent; ProSoCo, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Prepare written report, endorsed by Installer, listing any conditions requiring correction prior to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Commencement of installation indicates acceptance of conditions provided.

3.02 INSTALLATION, GENERAL

A. Do not wet concrete masonry units.

B. Cleaning Reinforcing: Before placing, remove loose rust, ice, and other coatings from reinforcing.

C. Thickness: Build cavity and composite walls, and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

1. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
2. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
3. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

D. Matching Existing Masonry Work: Match coursing, bonding, color, and texture of new masonry work with existing work unless otherwise indicated or if there is a unit size different or joint thickness variation. Tooth-in new masonry when tying into existing unless otherwise indicated on the drawings.

E. Tuck Pointing: Mortar shall be pre-hydrated. The specified ingredients shall be mixed with only enough water to produce a damp mass of such consistency that it will retain its form when pressed into a ball by the hands but will not flow under the trowel; then allowed to stand for not less than 1 hour nor more than 2 hours and remixed at once with the addition of enough water to produce satisfactory workability for immediate use. Tuck pointing is intended for use in repair work.

F. Select and arrange units for exposed brick unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed unless otherwise specifically indicated on documents.

3.03 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

B. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arises, do not exceed 1/4" in 10", or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, or 1/2" in 40' or more. For vertical alignment of head joints, do not exceed plus or minus 1/4" in 10', 1/2" maximum.

C. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

E. Variation In Mortar Joint Thickness:

1. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

F. Variation In Face Dimensions: For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

G. Variation In Alignment: For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.04 LAYING MASONRY WALLS

A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half size units at corners, jambs, and, wherever possible, at other locations.

B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

C. Pattern Bond: Lay exposed masonry in the bond pattern shown, or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2".

Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back ½-unit length in each course; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar unless otherwise indicated.

2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

3. Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

F. Build non-load-bearing interior partitions full height of story to within 1” of underside of solid floor or roof structure above, unless otherwise indicated. Coordinate this work with all required firestopping requirements.

1. Install compressible filler in joint between top of partition and underside of structure above.

2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.

3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

G. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes.

1. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

2. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16” o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.05 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and place units. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

D. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

E. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

F. Interior Exposure Joints: Provide concave joints horizontal and vertical.

G. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.06 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

1. For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes.

1. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

2. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16” o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.07 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.

2. Masonry Joint Reinforcement: Installed in horizontal joints.

a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.

b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.

B. Bond adjacent wythes of composite masonry together using full collar joints.

C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 16 inches o.c.

2. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

4. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16” o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.08 CAVITY WALLS

A. Tie wythes of cavity walls together using one of the following methods:

1. Ladder Type Pintel & Eye Joint Reinforcement: Installed in horizontal mortar joints where bed joints of both wythes align, use adjustable (two piece) ladder-type reinforcement on back-up masonry with pintel & eye extending across cavity securing veneer.

2. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.

3. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Attempting to remove mortar fins from cavity or to trowel them flat against brick usually results in increased mortar droppings at base of cavity; keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavity flush. Bevel beds away from cavity, to minimize mortar protrusions into cavity.

C. Provide weepholes (full head open cell joints) in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24" o.c., unless otherwise indicated.

D. Provide weep vents in exterior wythe of cavity wall located at top of cavity walls at 24” o.c., unless otherwise indicated.

3.09 CAVITY WALL INSULATION

A. Cavity insulation shall be installed continuously between lines of horizontal joint reinforcement butting edges flush. Adhere to back-up block and seal all joints with adhesive/sealer compatible with insulation, product as recommended by the insulation manufacturer.

B. Refer to Division 07 Section 072100 – Building Insulation & Section 072113 – Ultra Wall Insulation

and Air Barrier System for installation requirements applicable to continuous rigid insulation.

C. Provide insulation thickness as indicated on drawings.

3.10 HORIZONTAL JOINT REINFORCEMENT

A. General: Provide continuous horizontal joint reinforcements as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".

B. Cut or interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.

D. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections.

E. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

1. Space continuous horizontal reinforcement as follows:

    a. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by code but not more than 16" o.c. vertically.
    b. For foundation and parapet walls, space reinforcement at 8" o.c. vertically unless otherwise indicated.

2. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

    a. In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

3.11 CONTROL AND EXPANSION JOINTS

A. General: Provide vertical and horizontal expansion, control, and isolation joints in masonry where shown. Build-in related items as the masonry work progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

1. Build-in horizontal pressure relieving joints where indicated; construct joints by either leaving an air space or inserting non-metallic compressible joint filler of width required to permit installation of sealant and backer rod.

    a. Locate horizontal pressure relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

2. Build in vertical pressure relieving joints. Expansion joints shall be located in sizes and locations as shown on drawings.

3. Vertical control joints: unless otherwise noted, control joints shall be located as shown on drawings and/or in accordance with the ACI guidelines and specified herein. Location of all control joints shall be reviewed by Architect prior to proceeding with work.

    a. Vertical interior and exterior masonry control joints shall be ½" wide and filled with

appropriate caulk.

b. Control joint spacing for exterior and interior walls:

Wall Height (FT)	Horizontal Joint reinforcing 16" O.C.
Up to 8 feet	25 ft O.C.
8ft to 12 ft	30 ft. O.C.
Over 12 ft.	35 ft. O.C.

c. Control joints for interior and exterior masonry shall be located at the following points of weakness or high stress concentrations:

1) At all abrupt changes in wall height.

2) At all changes in wall thickness, such as those at pipe or duct chases and those adjacent to columns or pilasters.

3) Above joints in foundations and floors.

4) Below joints in roof and floors that bear on the wall.

5) At a distance of not over one-half the allowable joint spacing from bonded intersections or corners.

6) At one or both sides of all door and window opening unless other crack control measures as used, such as joint reinforcement or bond beams.

B. Control joints in 2 hour fire rated CMU walls shall be as follows: Joint size maximum ½" with nominal ¾" diameter polyethylene backer rod compressed and installed into joint with minimum of ¼" thick fill materials applied within the joint flush with both surfaces of the wall as manufactured by "3M Company" - model # FD-150+. Note: All installations shall be in accordance with UL guidelines for joint systems.

3.12 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members as detailed and indicated within the Construction Documents or where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.

2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

4. Coordinate anchors with flashing and air/vapor barrier requirements. Seal any penetrations necessary in flashing and air/vapor barriers.

B. Firewalls: Provide melt-away anchors at all firewalls to anchor masonry to structural members as detailed and indicated within the Construction Documents when required for structural bracing.

3.13 LINTELS

A. Install steel lintels of size and configuration shown where indicated in Construction Documents. Contractor is responsible to provide galvanized steel lintels at all exterior conditions where exposure to moisture is possible; regardless if indicated on drawings or not.

B. Provide minimum bearing of 6" at each jamb unless otherwise indicated.

3.14 FLASHING OF MASONRY WORK

A. Refer to Division 07 Section 072113 – Ultra Wall Insulation and Air Barrier System for installation requirements applicable to through wall flashing.

B. General: Provide concealed self-adhering through wall flashing in masonry work continuous at base of wall at or above shelf angles, lintels, ledges, and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior.

1. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Seal penetrations in flashing with mastic before covering with mortar.

2. Place horizontal leg of through wall flashing on sloping bed of mortar and cover with mortar. Set stainless steel drip plate into minimum of ¼” bead of water block sealant, apply spray primer and allow to dry 4 to 5 minutes; within 30 minutes of setting primer set self-adhering through wall flashing onto drip plate set back from face of exterior face of masonry.

3. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end then provide end dams at lintels and sills. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up typically two full cmu back-up courses (16”) but a minimum of 4" where restricted, and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.

4. Install flashing to comply with manufacturer's instructions.

5. Provide fully open cell weep hole head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c. unless otherwise indicated.

6. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

7. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 “Cavity Drainage Material” Article.

8. Install vents in head joints at top course of just below or where indicated in exterior wythes at spacing indicated or 24” o.c. Use specified weep/vent products to form vents.

    a. Close cavities off vertically and horizontally with treated wood blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.15 INSTALLATION OF REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated.

Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602. Place reinforcement of size and type and spacing as indicated in structural drawings.

C. Grouting: Grout reinforced cores full height in coordination with and as indicated on structural drawings. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches.

3. The use of mortar to fill the cells is not permissible.

3.16 INSTALLATION OF SELF-ADHERING TRANSITION MEMBRANES

A. Refer to Division 7 Section 072113 – Ultra Wall Insulation and Air Barrier System for installation requirements applicable to self-adhering transition membranes.

B. General: Provide self-adhering transition membranes locations including window & door openings, top of wall covering wood blocking tied into roofing, changes in materials, across expansion joints, around penetrations, structural steel exposed within the cavity and wherever indicated on the construction documents.

1. Coordinate installation of transition membranes with other materials utilized as part of the air/vapor barrier system utilizing compatible products.

2. Install transition membranes to comply with manufacturer's instructions.

3.17 REPAIR, POINTING, AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar. Point up all joints including corners, openings, and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly sets and cured, clean masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of

installed masonry.

3. Fully clean installation of exterior masonry with specified cleaner; apply and rinse, remove in accordance with manufacturer instructions.
4. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

5. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

6. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner as indicated in Part 2 “Masonry Cleaners” Article.

7. Clean exterior finished concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

E. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion. Protect waterproofing membrane and drain board work from other trades during construction. Backfill with specified materials, protect membrane from damage.

3.18 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, recycle or remove all surplus materials from the Project site(s).

END OF SECTION

DIVISION 05 – METALS

SECTION 050530 – COLD GALVANIZING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions of Division 01 Specification Sections, apply to work of this section.

B. Cold galvanizing of structural steel members, assemblies, and metal fabrications.

1.02 RELATED SECTIONS

A. Section 051200 – Structural Steel Framing
B. Section 052100 – Steel Joist Framing
C. Section 053000 – Metal Decking
D. Section 054000 – Cold Formed Metal Framing
E. Section 055000 – Metal Fabrications
F. Section 055200 – Metal Railings

1.03 REFERENCES

A. Specification Conformance Data:

1. Federal Specification DOD-P-21035A (formerly MIL-P-21035): Galvanizing Repair Specification
2. Federal Specification MIL-P-26915A (USAF Zinc Dust Primer)
3. Federal Specification TT-P-460 (Type 1, Zinc Dust)

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

   a. A239 - Locating the Thinnest Spot in a Zinc (Galvanized) Coating in Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)
   b. A780 - Repair of Damaged Hot-Dip Galvanizing
   c. B117 - Salt Spray (Fog) Testing)
   d. D520 - Specification for Zinc Dust (Metallic Zinc Powder)
   e. E376 - Measuring Coating Thickness by Magnetic Field or Eddy Current (Electromagnetic) Test Methods

2. Steel Structures Painting Council (SSPC):

   a. SSPC-PS 12.00 - Guide to Zinc-Rich Coating Systems
   b. SSPC Paint 20 - Zinc-Rich Primers, Type II, Organic
   c. SSPC-SP1 - Surface Preparation Specification No. 1 Solvent Cleaning
   d. SSPC-SP3 - Surface Preparation Specification No. 3 Power Tool Cleaning
   e. SSPC-SP6 - Surface Preparation Specification No. 6 Commercial Blast Cleaning
   f. SSPC-SP10 - Surface Preparation Specification No. 10 Near White Blast Cleaning

1.04 DEFINITIONS

A. Cold Galvanizing: A method of applying a zinc coating to structural steel members, assemblies,

and fabrications at ambient temperatures to achieve long-term corrosion protection.

B. Cathodic Protection: Reduction or prevention of corrosion of a metal surface by making it a cathode in an electrolytic cell.

C. Galvanic Action: When two dissimilar metals come into electrical contact with each other in the presence of an electrolyte, the less noble metal (zinc) will sacrifice itself (corrode) to protect the more noble metal (steel, iron, or aluminum).

1.05 SYSTEM DESCRIPTION

A. A metallic zinc coating, containing 95 percent zinc in the dried film that imparts cathodic protection to ferrous and non-ferrous metals through its galvanic action and is recognized by Underwriter's Laboratories, Inc., as an equivalent to commercial hot-dip galvanizing. This coating, in its dry form, is non-toxic and essentially free of such heavy metals as lead, cadmium, barium, antimony, arsenic, chromium, copper, mercury, molybdenum, selenium, silver, and tellurium.

1.06 SUBMITTALS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Submit manufacturer’s product data, application instructions, and warranty information.

C. Contractor shall furnish the Architect/Engineer with certification that the materials furnished under this specification meet or exceed the requirements herein.

D. Contractor shall furnish the Architect/Engineer with certification that surface preparation of the substrate to be coated has been performed satisfactorily, as herein specified, prior to application of the coating.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Aerosols (12 oz.), half-pints (1.5 lbs.), quarts (6 lbs.), gallons (24 lbs.), or 3.5 gallons (84 lbs.) containers of types suitable to prevent leakage of contents.

B. Acceptance at site: Material shall be accepted at site providing no damage deleterious to products' function is visible and applicable material safety data sheets are present.

C. Storage and Protection: Do not store containers above 104°F. Store containers out of sunlight and away from heat and sparks. Keep containers away from children.

1.08 PROJECT/SITE CONDITIONS

A. Drying time of coating is dependent upon temperature, but product has no application temperature limit.

B. Surface temperature of the substrate to be coated shall be at least 5° above the dew point to avoid possible condensation.

C. Humidity shall be less than 85 percent R.H.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. For the purpose of establishing a level of quality and performance, this specification is based on products manufactured by: Z.R.C. Worldwide, 145 Enterprise Drive, Marshfield, Massachusetts, 02050, (781) 319-0400.

1. Z.R.C. Cold Galvanizing Compound, or equal as approved by the Architect/Engineer.

B. For LEED projects, in lieu of 201.A.1, utilize ZRC Zero-VOC Water-Based Cold Galvanizing Compound.

2.02 MATERIALS

A. Specifications (Based on ZRC Cold Galvanizing Compound):

Type:	Single pack, premixed, ready to apply, U.L. recognized, liquid organic zinc compound.
Finish:	Flat light gray.
Theoretical Coverage:	450 square feet per gallon at 1.5 mil dry film thickness.
Metallic zinc content:	95 percent by weight in dry film.
Flash point:	104°F (SETA method, ASTM D-3278).
Weight per gallon:	24 lbs.
Solids Content:	52%° by volume (ASTM D-2832).
VOC Content:	385 g/l (3.3 lbs./gal.) (ASTM D-1475).
Viscosity:	1,900 cps. - Brookfield spindle No. 6 at 100 RPM at 25°C (ASTM D-2196).
Maximum service temperature:	750°F (ASTM D-2485).
Specific gravity:	2.797 (ASTM D-1963).
Electrical Conductivity:	73 million ohms per 3 mil dry (resistivity).
Impact resistance:	Greater than 30-inch lbs. (extrusion per ASTM D-2794).
Abrasion resistance:	11.5 liters per dry mil (tested at 3 dry mils per ASTM D-968).
Pot life:	At least 24 hours.
Shelf life:	Bulk type, 3 years minimum; aerosol type, 1 year minimum.
Dry time:	(Set to touch) When ambient air-dried, 20-30 minutes (ASTM D-1640).
Recoat time:	(Second coat) After 12 hours. Under certain conditions, recoat time can be reduced. Please contact manufacturer for specifics.

B. Substrates acceptable for coating.

1. Substrates shall be of iron, steel, or aluminum including structural shapes, pipe, sheet, fabrications, and assemblies.

2. Substrates of iron, steel, or aluminum may be satisfactorily coated regardless of carbon, phosphorus, manganese, or silicon inclusion.

2.03 EQUIPMENT

A. Coating shall be applied by brush, roller, low pressure compressor-type spray or airless-type spray.

B. Refer to Section 3.03 B for specific equipment information.

2.04 MIXES

A. Coating herein specified is a one-component, premixed, ready to apply compound.

B. Contents of containers shall be stirred well upon opening and during application to ensure homogeneous mix.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Iron, steel, or aluminum surfaces to be coated shall be clean; i.e., devoid of grease, oil, mill scale, oxidation, loosely adherent rust, paint, etc.

B. Coating shall be applied directly to metal surface to be galvanically active.

3.02 PREPARATION

A. Surface preparation is dependent upon substrate condition and intended service. Preparation shall be in accordance with manufacturer’s requirements for substrate to be coated.

B. Typical examples are as follows:

Grease and oils:	Solvent clean to SSPC-SP1
Rust scale or easy to remove paint:	Power tool clean to SSPC-SP3
Mill scale or firmly adhered paint:	Sandblast to SSPC-SP6 (commercial)
Water immersion:	(100°F maximum) Sandblast to SSPC-SP10 (near-white)

3.03 APPLICATION

A. General Application Information:

1. The coating shall be applied at sufficient wet film thickness to achieve a minimum dry film build of 2.5-3.5 mils, using manufacturer's recoat time directions.

2. The coating has good brushing properties and is suitable for spray application, when such application is specified.

3. Thinning with appropriate thinners as recommended by the manufacturer is allowed provided film thickness requirements can be maintained and other properties of the coating remain uncompromised.

4. The coating shall be well stirred before use so that it is completely homogeneous during application.

5. Continuous agitation (by means of an in-pot power mixer) is strongly recommended to ensure the continuous application of a completely homogeneous material at all times.

6. Omit coating of surfaces to be welded in the field. Coat in the field after welding to obtain uniformity and equal protection with adjacent surfaces.

7. Material partially used at the end of any day shall be protected from skinning by placing thick blanket of solvent over remaining coating followed by careful closing of containers. Coating may be reused on the following day after total rehomogenization.

B. Specific Application Information:

1. Application by brush or roller: Apply as received in container. For Brush application, its recommended only 100% Natural Chinese bristle brushes. For Roller Application, its recommended rollers with a 3/8” nap, made of mohair or lambs wool (sheepskin).

2. Application by low pressure compressor type spray:

Atomized air pressure:	50 lbs.
Fluid pressure:	15-20 lbs.
Orifice of tip:	80/100ths (.080)
Viscosity reduction:	4 parts Coating to 1 part mineral spirits solvent, or 16 parts Coating to 1 part Xylene

3. Application by airless type spray:

Pump:	30:1
Hose:	1/2" (I.D.) Airless type
Orifice of tip:	600 - 26/1000 ths. (.026)
Type of tip:	Tungsten carbide, reversing (self-cleaning)
Filter screens:	Complete removal is recommended. If screens are employed, use no less than 30 mesh.
Viscosity:	No reduction required.
Recommended procedure:	Connect hose directly to pump without filter assembly, ensuring a hose length of 50 feet maximum. Use least pressure possible. Start at 1,500 lbs. and increase as required for good spraying properties.

C. Clean Up: Use mineral spirits solvent or Xylene.

3.04 FIELD QUALITY CONTROL

A. Inspect installed galvanized materials, fabrications, and assemblies for coating thickness in accordance with ASTM E-376.

3.05 ADJUSTING

A. After erection, on all uncoated areas, prepare and apply coating as per Section 3.03 above.

B. Touch up any areas where shop coat has been damaged in accordance with ASTM A-780.

3.06 PROTECTION

A. After 24-48 hours, cold galvanizing coating can be painted/coated with acrylic, chlorinated rubber, epoxy, urethane, or vinyl type products if painting is specified in the Contract Documents.

B. Do not top-coat with alkyd or lacquer type products.

END OF SECTION

DIVISION 05 – METALS

SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section. This Section includes the following: structural steel, grout.

1.02 SUMMARY

A. Extent of structural steel work is shown on drawings, including schedules, notes, and details to show size and location of members, typical connections, and type of steel required.

B. Structural steel is that work defined in American Institute of Steel Construction (AISC) *"Code of Standard Practice",* and as otherwise shown on drawings.

C. Miscellaneous metal fabrications are specified elsewhere in Division 05. Refer to Division 03 for anchor bolt installation in concrete; Division 04 for masonry.

D. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and test will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components which do not comply.

E. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Contractor shall retain the services of a licensed professional engineer for the design of any connections not shown on the drawings.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

F. Related Sections include the following:

1. Section 053000 – Metal Decking; for field installation of shear connectors.

2. Section 055000 – Metal Fabrications; for steel lintels or shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel, including, but not limited to, loose steel bearing plates for structural steel and miscellaneous steel shapes for framing deck openings.

1.03 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents

to be selected or completed by the fabricator to withstand design loadings indicated.

B. Connections: Provide details of connections to withstand loads and other design criteria indicated and to comply with other information and restrictions indicated.

1. Steel fabricator shall detail connections using sections, details, typical details, and other requirements indicated on the structural drawings and using the schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4 to resist loads and other design criteria specified on the structural drawings.

C. Construction: Type 2, simple framing.

D. Engineering Responsibility: Under Base Bid submitted, the Prime Contractor shall engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.05 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

2. High-strength bolts (each type), including nuts and washers.

3. Structural steel primer paint.

4. Shrink-resistant grout.

C. Shop Drawings: Submit shop drawings prepared under the supervision of a registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams. Show fabrication of all structural steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Indicate type, size and length of bolts, distinguishing between shop and field bolts.

2. Provide setting drawings, templates, and directions, for installation of anchor bolts and other anchorages to be installed as work of other sections.

3. Include embedment drawings.

4. Include welding certificates.

5. Include shop drawings signed and sealed by a qualified professional engineer responsible for their preparation.

6. Qualification Data: For installer, fabricator, Professional Engineer, and testing agency.

7. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

a. Structural steel, including chemical and physical properties.
b. Bolts, nuts and washers, including mechanical properties and chemical analysis.
c. Direct-tension indicators.
d. Tension-control, high-strength bolt-nut-washer assemblies.
e. Shear stud connectors.
f. Shop primers.
g. Non-shrink grout.

1. Include source quality-control test reports.

D. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

E. Surveys: Submit certified copies of each survey conducted by a registered Professional Engineer or land surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel, and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

1.06 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. AISC "*Code of Standard Practice for Steel Buildings and Bridges*."

a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings."

2. AISC *"Seismic Provisions for Structural Steel Buildings"*

3. AISC *"Specifications for the Design, Fabrications, and Erection of Structural Steel for Buildings,"* including "Commentary" and Supplements thereto as issued.

4. AISC *"Specifications for Architecturally Exposed Structural Steel."*

5. AISC *"Specifications for Structural Joints using ASTM A325 or A490 Bolts"* approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

6. AISC *"Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design".*

7. AISC *"Specification for the Design of Steel Hollow Structural Sections".*

8. AISC *"Specification for Allowable Stress Design of Single-Angle Members".*

9. American Welding Society (AWS) D1.1 *"Structural Welding Code - Steel."*

10. ASTM A6 "*General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."*

11. Research Council on Structural Connections' (RCSC) *"Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."*

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance

with AWS D1.1, *"Structural Welding Code – Steel."*

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If re-certification of welders is required, retesting will be Contractor's responsibility.

C. Installer's Qualifications: A qualified installer who is familiar with and performs work in accordance with AISC's *"Code of Standard Practice for Steel Buildings and Bridges"* and *"Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design"* and OSHA's Steel Erection Standard and who has successfully completed projects of similar size and complexity.

D. Fabricator's Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:

a. Category: Complex steel building structures.

b. Fabricator shall be registered with and approved by authorities having jurisdiction.

E. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports and spacers. Protect steel members and packaged materials from corrosion or deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

2. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use.

1.08 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General: For fabrications of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes.

B. Structural Steel Shapes, Plates, and Bars: ASTM A992/A572-50. minimum F_y = 50 ksi.

C. Channels and Angles, Plates and Bars: ASTM A 36, minimum F_y = 36 ksi.

D. Cold-Formed Steel Tubing / Hollow Structural Sections (HSS): ASTM A500, Grade B; minimum F_y = 46 ksi, structural tubing.

E. Hot-Formed Steel Tubing: ASTM A501.

F. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.

G. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold finished carbon steel; with dimensions headed-stud type, cold-finished carbon steel; Type B, complying with AWS D1.1 requirements.

H. Anchor Bolts: ASTM F 1554, Grade 36; non-headed type unless otherwise indicated.

1. Configuration: As shown in contract documents.
2. Nuts: ASTM A 563 heavy hex carbon steel.
3. Plate Washers: ASTM A 36 carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain typical, except hot-dip zinc coating, ASTM A 153, Class C for galvanized members.

I. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

    a. Finish: Plain typical, except hot-dip zinc coating, ASTM A 153, Class C for galvanized members.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.

    a. Direct tension indicator washers may be used at Contractor's option.

J. Electrodes for Welding: Comply with AWS Code requirements, E70XX minimum.

K. Primer:

1. Primer for steel not exposed to weather or exterior conditions: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664.

2. Primer for exterior exposed steel:

a. Prime coat: Tnemec series 90-97 zinc-rich aromatic urethane primer.
b. Intermediate coat: Tnemec series 66 polyamide epoxy coating.

L. Loose and Hung Lintel Steel Primer Paint: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer, similar or equal to: 50-330 Poly-Ura-Prime by Tnemec Co., Inc.

2. Lintel angles for exterior veneer, either loose or hung, shall be hot dip galvanized. Final painting shall be after installation, but prior to installation of items in masonry openings.

M. Galvanizing Repair Paint: Comply with Fed. Spec. SSPC-Paint 20.

N. Non-metallic Shrinkage-resistant Grout: Factory-packaged, pre-mixed, non-metallic, non-corrosive, non-staining aggregate grout containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621 and ASTM C1107. Mixed with water to consistency suitable for application and a 30-minute working time.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

a. Euco N.S.; Euclid Chemical Company.
b. Crystex; L & M Construction Chemicals.
c. Masterflow 713; Master Builders.
d. Five Star Grout; U.S. Grout Corporation.
e. Upcon; Upco Chemical Division, USM Corporation.
f. Propak; Protex Industries, Inc.
g. Set Non-Shrink; Set Products, Inc.

O. Combined post-consumer and post-industrial recycled content of all structural steel components must be at least 90%, electric arc furnace steel.

2.02 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC's *"Code of Standard Practice for Steel Buildings and Bridges"* and AISC's *"Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."* and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected. Mark and match-mark materials for field assembly.

2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.

2. Provide unfinished threaded fasteners for only bolted connections of secondary framing

members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with RCSC's *"Specifications for Structural Joints using ASTM A325 or A490 Bolts"* for type of bolt and type of joint specified or required.

D. Welded Construction: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance and quality of welds, and for methods used in correcting welding work.

1. Assemble and weld built-up sections by methods which will produce and maintain true alignment of axes without warp and without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with AWS D1.1 and manufacturer's written instructions.

F. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

G. Holes for Other Work: Provide holes as required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings. Holes not indicated on structural drawing are not permitted without written approval from the Structural Engineer.

1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not thermally cut holes or enlarge holes by burning. Drill holes in bearing plates.

3. Base-Plate Holes: Cut, drill or punch holes perpendicular to steel surfaces.

4. Weld threaded nuts to framing and other specialty items indicated to receive other work.

H. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

I. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

J. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.

2.03 SHOP PAINTING

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only. Accurately finish ends of columns and other members transmitting bearing loads.

1. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.

2. Do not paint surfaces which are scheduled to receive sprayed-on fireproofing.

3. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Surface Preparation: After inspection and before shipping, clean steel surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with one of the approved Steel Structures Painting Council (SSPC) methods as follows:

1. SP-1 "Solvent Cleaning."
2. SP-2 "Hand Tool Cleaning."
3. SP-3 "Power Tool Cleaning."
4. SP-5 "White Metal Blast Cleaning."
5. SP-6 "Commercial Blast Cleaning."
6. SP-7 "Brush-Off Blast Cleaning."
7. SP-10 "Near-White Blast Cleaning."

C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's written instructions and at a rate recommended by SSPC to provide dry film thickness of not less than 1.5 mils. Use painting Paint System Guide No. 7.00, and priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Provide a one-coat shop applied paint system complying with Steel Structures Painting Council (SSPC), methods which result in full coverage of joints, corners, edges, and exposed surfaces.

2.04 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.

1. Fill vent holes and grind smooth after galvanizing.

2. Galvanize lintels, shelf angles, beams and all other steel members located in exterior walls supporting and/or in contact with masonry veneer and/or masonry back-up.

2.05 SOURCE QUALITY CONTROL

A. Contractor will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's *"Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."*

D. Welded Connections: In addition to visual inspection required for every weld, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Ultrasonic Inspection: ASTM E 164.
2. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

F. Extent of Inspection and Testing:

1. Bolted Connections:

a. 100 percent of shop-bolted connections shall be visually inspected.

2. Welded Connections:

a. 40 percent of shop-welded connections shall be visually inspected.

b. 100 percent of partial penetration and full penetration type shop welded connections shall be tested by ultrasonic or radiographic inspection.

c. All welds suspected of being defective based on visual inspection shall be tested by ultrasonic or radiographic inspection.

3. Shear Connectors:

a. 100 percent welded shear connectors shall be visually inspected.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods/bolts, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 ERECTION

A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Set structural steel accurately in locations and to elevations indicated and according to AISC's *"Code of Standard Practice for Steel Buildings and Bridges" and "Specification*

for Structural Steel Buildings--Allowable Stress Design and Plastic Design." Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads, as required. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces, prior to setting base, bearing and leveling plates. Clean bottom surface of base, bearing and leveling plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges, shims, setting/leveling nuts or other adjusting devices as required and adjust column base leveling nuts as required.

a. Snug-tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

b. Pack grout solidly between bearing surfaces and base or bearing plates to ensure that no voids remain. Neatly finish exposed surfaces, protect installed materials and grout, and allow to cure.

c. For proprietary grout materials, comply with manufacturer's written instructions for shrinkage-resistant grouts.

E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure within specified AISC tolerances.

2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at time of erection and mean temperature at which structure will be when completed and in service.

3. Splice members only where indicated and accepted on shop drawings and as required to meet OSHA's Steel Erection Standards.

4. Do not use thermal cutting during erection.

5. Maintain erection tolerances of structural steel within AISC's *"Code of Standard Practice for Steel Buildings and Bridges."*

F. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

    a. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

H. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

    1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

I. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel is included in Division 9 under painting work.

3.04 FIELD CONNECTIONS

A. High Strength Bolts: Install high-strength bolts according to RCSC's *"Specification for Structural Joints Using ASTM A 325 or A 490 Bolts"* for type of bolt and type of joint specified.
    1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

    1. Comply with AISC's *"Code of Standard Practice for Steel Buildings and Bridges"* and *"Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design"* for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

    2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's *"Code of Standard Practice for Steel Buildings and Bridges"* for mill material.

3.05 FIELD QUALITY CONTROL:

A. The Contractor shall make arrangement for and the Owner shall pay for an independent testing and inspection agency to inspect and test high-strength bolted connections and welded connections, to perform tests and prepare test reports, in conformance with all Special Inspection requirements. The Contractor will be responsible for all costs associated with failed tests.

    1. Testing agency shall conduct and interpret tests, and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

    2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

    3. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

    4. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's

expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

B. Shop Bolted Connections: Inspect or test in accordance with AISC specifications.

C. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option:

a. Liquid Penetrant Inspection: ASTM E165.

b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."

d. Ultrasonic Inspection: ASTM E164.

D. Field Bolted Connections: Inspect in accordance with RCSC's *"Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."*

E. Field Welding: Field welds will be visually inspected according to AWS D1.1, ***and in accordance with Chapter 17 requirements of the NYS Building Code***. Inspect and test during erection of structural steel as follows:

1. Verify certification of welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3. The testing agency shall perform tests of welds as follows:

a. Liquid Penetrant Inspection: ASTM E165.

b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."

d. Ultrasonic Inspection: ASTM E164.

4. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

5. Extent of Inspection and Testing:

1. Bolted Connections:

a. 100% of field-bolted connections shall be visually inspected.

2. Welded Connections:

a. 100% of field-welded connections shall be visually inspected.

b. 100% of partial penetration and full penetration type field-welded connections shall be tested by ultrasonic or radiographic inspection.

c. 100% of any weld suspected of being defective based on visual inspection shall be tested by ultrasonic or radiographic inspection.

6. Shear Connectors:

a. 100% of field-welded shear connectors shall be visually inspected.

b. Any shear connector suspected of being defective based on visual inspection shall be tested by bend test.

c. Additional 10% minimum of total number of shear connectors shall be tested by bend test if weld fracture occurs on shear connectors already tested.

F. Installation of hangers and supports on structural components by Mechanical Contractor and/or Plumbing Contractor.

1. Structural steel (wide flange and standard beams, channels):

a. Mechanical Contractor and/or Plumbing Contractor to install individual supports/hangers and trapezes off center of structural steel component.

2. Light gauge metal trusses:

a. Mechanical Contractor and/or Plumbing Contractor to install individual support/hangers and trapezes only at panel points. The Mechanical Contractor and/or Plumbing Contractor shall reimburse the General Contractor (who is supplying the trusses) to provide reinforcing per manufacturers recommendations. ***If work is in an existing structure, no panel point deviation will be permitted and the Mechanical Contractor provides hanging/support details showing reinforcement of existing structural components designed, signed and sealed by an Engineer licensed in the State of New York.***

3.06 REPAIRS AND PROTECTION:

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural steel and accessories, bearing plates, and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

DIVISION 05 – METALS

SECTION 052100 – STEEL JOIST FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Extent of steel joists and joist girders is shown on drawings, including basic layout and type of joists required.

B. This Section includes the following:
   1. K-Series Steel Joists
   2. LH-Series Long-span Steel Joists
   3. Joist Girders
   4. Joist Accessories

1.03 RELATED SECTIONS

A. Section 051200 – Structural Steel Framing
B. Section 053000 – Metal Decking
C. Section 055000 – Metal Fabrications

1.04 REFERENCES

A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.

B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

E. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts

F. ASTM B 695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

G. ASTM F 436 - Standard Specification for Hardened Steel Washers

H. AWS D1.1 - Structural Welding Code – Steel

I. Steel Joist Institute (SJI) - Standard Specifications, Load Tables & Weight Tables for Steel Joists and Joist Girders.

J. SJI - Code of Standard Practice

1.05 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.06 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI "Specifications."

C. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, joining, and accessories.

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.
4. Provide templates or location drawings for installation of anchor bolts and metal bearing plates.

D. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within previous 12 months.

E. Certification: Submit evidence of SJI membership and that joists and joist girders have been designed in accordance with SJI requirements.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Member of the Steel Joist Institute who regularly produces steel joists of the K, LH, or DLH Series, or joist girders conforming to SJI's Specifications and Load Tables and whose designs have been checked and accepted by the Steel Joist Institute.

B. Provide joists fabricated in compliance with the following, and as herein specified.

1. Steel Joist Institute (SJI) "Standard Specifications, Load Tables, and Weight Tables" for:

a. K-Series Open Web Steel Joists.
b. LH-series Long-Span Steel Joists
c. Steel joist accessories

C. Design connections under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

D. Qualification of Field Welding: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Inspection: Inspect joists and girders in accordance with SJI specifications.

F. Performance Test: If required, conduct performance tests in accordance with procedures

described in SJI "Recommended Code of Standard Practice."

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel joists as recommended in SJI "Specifications."

B. Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

C. Do not store joists directly on the ground.

D. Store materials in a manner which will permit easy access for inspection and identification.

E. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.09 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide Steel Joists in conformance with SJI - Standard Specifications, Load Tables & Weight Tables for Steel Joists and Joist Girders.

B. Open Web Joists Members: SJI Type

1. Open Web Steel Joists (K Series).
2. Longspan Steel Joists (LH Series).
3. Deep Longspan Steel Joists (DLH Series).
4. Joist Girders.
5. Composite Joist (CJ Series).

C. Bridging: Provide bridging of material, size, and type required by SJI Standard Specifications for type of joist, chord size, spacing, and span.

D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
1. Finish: Plain, uncoated.
2. Finish: Hot-dip zinc coating, ASTMA153/A153M, Class C.
3. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

E. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
1. Finish: Plain, uncoated.
2. Finish: Hot-dip zinc coating, ASTMA153/A153M, Class C.
3. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

G. Field Welding in accordance with AWS and SJI.

H. Steel Prime Paint: Comply with SJI "Specifications" and see Section 051200, "Structural Steel".

I. Bedding Mortar: For joist ends bearing on concrete or masonry, provide bedding mortar as follows:

1. Non-metallic shrinkage-resistant mortar; premixed, non-corrosive, non-staining product containing selected silica sand, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C621.

2. Products: Provide non-metallic, shrinkage resistant mortar as manufactured by one of the following:

a. Euco N.S.; Euclid Chemical Co.
b. Crystex; L & M Construction Chemicals.
c. Masterflow 713; Master Builders.
d. Five Star Grout; U.S. Grout Corp.
e. Upcon; Upco Chem. Div., USM Corp.
f. Propak; Protex Industries, Inc.

2.02 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification."

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable SJI "Specifications" and load tables.

D. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1" of finished wall surface unless otherwise indicated.

E. Camber joists according to SJI Standard Specifications.

F. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications."

1. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

G. End Anchorage: Provide end anchorages including bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications," unless otherwise indicated.

H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

I. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

1. Apply one shop coat of steel prime paint to joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.

1. Anchors: Furnish anchor bolts, bearing plates, and other devices to be built into concrete and masonry construction.

    b. Provide unfinished threaded fasteners for anchor bolts, unless otherwise indicated.

    c. Refer to Division 03 sections for installation of anchors set in concrete.

    d. Refer to Division 04 sections for installation of anchors set in masonry.

2. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

    a. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

    b. Where "open web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

    c. Align and adjust joists and joist girders accurately before fastening. Tolerances shall conform with AISC Code of Standard Practice for Steel Buildings and Bridges. Fastening of splices of compression members shall be performed after the abutting surfaces have been brought into contact. Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled. Splices will be permitted only where indicated.

    d. Set joists and joist girders accurately at the established lines and levels. Joists and joist girders shall be plumb and level (with indicated allowance for camber) before bolting is commenced. Temporary bracing shall be provided as required and shall be kept in position until completion of erection, anchorage, and bridging installation.

3. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

    a. Install horizontal bridging for top and bottom chords as indicated and in accordance with the SJI Standard Specifications and Code of Standard Practice.

4. Fastening Joists:

    a. Field weld joists to supporting steel framework in accordance with SJI "Specifications" for

type of joists used. Coordinate welding sequence and procedure with placing of joists.

b. Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI "Specifications" for type of steel joist used.

c. Bolt joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used.

1) Provide high-strength threaded fasteners for bolted connections of steel joists to steel columns, and at other locations where shown. Install in accordance with AISC "Specifications for Structural Joints Using ASTM A 325 or A490 Bolts."

2) Touch-Up Painting: After joist installation, paint field bolt heads and nuts, welded areas, and abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

B. Frame openings greater than 18 inches with supplementary framing.

C. Do not permit erection of decking until joists are properly bridged and secured.

D. Installation of hangers and supports on structural components by Mechanical Contractor and/or Plumbing Contractor.

1. Structural steel (wide flange and standard beams, channels):

a. Mechanical Contractor and/or Plumbing Contractor to install individual supports/hangers and trapezes off center of structural steel component.

2. Steel Joists:

a. Mechanical Contractor and/or Plumbing Contractor to install individual supports/hangers and trapezes only at panel points. If point of attachment is more than 1-1/2” laterally off panel point the Mechanical Contractor and/or Plumbing Contractor shall reimburse the General Contractor (who is supplying the joists) to provide reinforcing per steel joist manufacturers recommendations. If work is in an existing structure, no panel point deviation will be permitted, unless the Division 15 Contractor provides hanging/support details showing reinforcement of existing structural components designed, signed and sealed by an Engineer licensed in the State of New York.

3. Light gauge metal trusses:

a. Mechanical Contractor and/or Plumbing Contractor to install individual support/hangers and trapezes only at panel points. The Mechanical Contractor and/or Plumbing Contractor shall reimburse the General Contractor (who is supplying the trusses) to provide reinforcing per manufacturers recommendations. If work is in an existing structure, no panel point deviation will be permitted and the Division 15 Contractor provides hanging/support details showing reinforcement of existing structural components designed, signed and sealed by an Engineer licensed in the State of New York.

E. Do not field cut or alter structural members without approval of Architect/Engineer and the Joist Fabricator.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E165/E165M.
b. Magnetic Particle Inspection: ASTM E709.
c. Ultrasonic Testing: ASTM E164.
d. Radiographic Testing: ASTM E94.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

END OF SECTION

DIVISION 05 – METALS

SECTION 053000 – METAL DECKING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish material, labor, equipment, services necessary to erect all metal deck, including connections, welding and accessories required for installation of Work. Field cut and fit deck as required and cut all openings.

B. Place edge of deck at proper location to ensure proper placement of masonry. Set deck edge from a survey line based on the theoretical building line.

1.02 RELATED SECTIONS

A. Section 051200 – Structural Steel Framing
B. Section 052100 – Steel Joist Framing
C. Section 055000 – Metal Fabrications
D. Section 078100 – Spray-Applied Fire Resistive Materials

1.03 REFERENCES

References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work**.**

A. American Society Testing and Materials (ASTM) standards, latest editions.

1. A29 - Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

2. A36 - Standard Specification for Carbon Structural Steel.

3. A108 - Standard Specification for Steel Bars, Carbon, Cold-finished, Standard Quality.

4. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

5. A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coating.

6. A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing

7. B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

B. "Specification for Structural Steel Buildings” - American Institute of Steel Constructor's (AISC 360-05).

C. “Seismic Provisions for Structural Steel Buildings” (AISC 341-05).

D. “Structural Design of Composite Slabs” – American Society of Civil Engineers (ASCE 3-91).

E. “Standard for Noncomposite Steel Floor Deck” - Steel Deck Institute (ANSI/NC 1.0-06)

F. “Standard for Steel Floor Deck” – Steel Deck Institute (ANSI/RD 1.0-06).

G. Safety Requirements for Powder-Actuated Fastening Systems (ANSI A10.3), American National Standard (ANSI).

H. International Code Council Evaluation Service (ICC-ES):

1. International Building Code

2. Acceptance Criteria for Steel Deck Roof and Floor Systems (AC43)

3. Steel Deck Diaphragms (ESR-2199)

I. "Structural Welding Code - AWS D1.1" - American Welding Society (AWS).

J. "Specifications for Mild Steel Covered Arc - Welding Electrodes - AWS A5.1" - AWS.

K. "Diaphragm Design Manual for Floor Decks and Roof Decks" 3rd Edition - Steel Deck Institute (SDI).

L. "Fire Resistance Directory" - Underwriters Laboratory (UL).

1.04 DESIGN REQUIREMENTS

A. Design of metal deck is governed by Chapter 22 of the 2020 NYS Building Code. Structural integrity requirements of the BC shall be met.

B. Metal deck unit sizes and gages are indicated on the Drawings.

C. Units shall be of three-span length except where framing layout does not permit. Deck sheets shall be butted over supports.

D. Provide shoring where required by the deck manufacturer as indicated on the approved shop drawings and where indicated on the Contract Documents.

E. Use of integral and non-piercing hanger tabs to support ceiling systems is not permitted. Piercing hanger tabs with a safe working loading of 250 lbs or greater are permitted for ceilings weights below the hanger tab capacity. Integral hanger tabs are to be used for venting purposes only.

F. Units included in a fire rated assembly must be classified in appropriate UL designs or have MEA, BSA, or OTCR approval.

G. Use fasteners or welds for decking attachment that provide adequate diaphragm shear strength, uplift resistance and stiffness for imposed load combinations.

H. Performance Requirements: FM classified Class I-90 minimum for uplift resistance and UL fire classified for roof deck.

1.05 SUBMITTALS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Product Data:

1. Submit manufacturer's specifications for

a. Shear stud connectors
b. Deck Fasteners, if used
c. Primer Paint

C. Shop Drawings:

1. Prepare metal deck shop drawings immediately after award of Contract.

2. Shop drawings shall include, but not be limited to the following:

a. Type and gage of metal deck.
b. Metal deck layout and orientation, including clear indication where shoring is required.
c. Welding or fastener types, sizes and pattern.
d. Side and end details of metal deck.
e. Supplementary framing details.
f. Location of all openings and fittings.
g. Shop finish.
h. Size, location, and spacing of stud shear connectors, where required, for each beam.
i. Designation of welding electrode strength to be used.

D. Shop drawings reviewed by the Engineer of Record for general conformity with the Drawings shall not relieve the Contractor or the metal deck supplier of responsibility for correctness of fit, quantities of materials, and adequacy of attachment details of deck and accessories to the structural steel. Deck must have UL or OTCR approval as part of the fire rated assembly. Approval of shop drawings does not absolve the Contractor of this requirement.

E. Calculations in accordance with ICC-ES AC 43 or SDI Design Method verifying diaphragm shear strength and stiffness: Submit calculations for the load tables of the metal deck supplied. Calculations shall be signed and sealed by a Professional Engineer licensed in the State of New York.

F. Quality Control Submittals:

1. Certificates

a. Submit notarized certificates from the manufacturers of the specified materials stating compliance with the applicable requirements set forth for all materials specified in this Section.

b. Furnish steel manufacturer's certificate certifying welders employed on the Work have met AWS qualifications within the previous twelve months, and for work performed in the field are licensed welders.

c. Furnish proof that deck to be used is part of a UL, MEA, BSA, or OTCR approved fire-rated assembly if other than deck shown on Drawings.

d. Submit certificate stating deck manufacturer is a member producer of SDI.

2. Manufacturers' Instructions: Furnish manufacturers' printed material, specifications and installation instructions for each type of decking, accessories, and studs.

3. Contractor Qualifications

G. Provide proof of Manufacturer, Erector, welder, and mechanical fastener technician qualifications specified under “Quality Assurance”.

H. Surveys:

1. Submit signed and sealed copies of surveys conducted by a Licensed Land Surveyor showing locations of edge of deck with respect to theoretical edge of deck and building survey line.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer: Company specializing in the manufacture of metal deck as used in this Contract shall have a minimum of five years experience and is a member producer of SDI.

2. Erector: Company specializing in performing the Work of this Section shall have a minimum of three years experience and have done at least three projects with similar quantity of material.

3. Welders: All steel roof deck welders shall be AWS certified for welding of sheet steel.

4. Mechanical Fastener Installer: Shall be certified or licensed by the fastener and tool system manufacturer on the project site in accordance with ANSI A10.3 requirements. Certification or licensing includes all training necessary for proper tool operation, fastener selection, maintenance and troubleshooting.

B. Regulatory Requirements

1. Building Code: Work of this Section shall conform to all requirements of the NYS Building Code and all applicable regulations of other governmental authorities. Where more severe requirements than those contained in the Building Code are given in this Section, the requirements of this Section shall govern.

2. Industry Standards: Standards specified herein shall apply to Work of this Section. Where more severe requirements then those contained in the standards are given in this section or the Building Code, requirements of this Section or the Building Code shall govern.

a. AISC 360-05 as modified by the 2020 NYS Building Code.

b. Seismic Provisions for Structural Steel Buildings AISC 341-05.

c. 2020 NYS Building Code

d. Fire Resistance Directory - UL.

1) Composite metal deck shall have UL approval with respect to the following:

2. As a component part of a floor construction of specified fire resistance rating without need for sprayed fireproofing on underside of deck.

3. As a component part of a three-hour fire resistive floor construction with use of sprayed fireproofing on underside of deck.

1) Roof deck shall have UL approval as a component part of the specified fire resistive roof construction.

2) Recommendations or suggestions in the codes and references listed in this Article and under “References” shall be deemed to be mandatory unless they are in violation of the Building Code.

B. Certifications

1. Structural metal deck and stud shear connectors shall conform to the material acceptance, certification and inspection requirements of the BC.

2. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver deck to site undamaged. With each deck unit bearing the UL label and marking for specific system detailed.

B. Store deck units off the ground with one end elevated to provide drainage. Protect units from the elements with a waterproof covering.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Metal Deck and Accessories

1. CANAM Steel Corporation
2. Wheeling Corrugating Co.
3. Nucor, Vulcraft Group

B. Stud Shear Connectors

1. Nelson Stud Welding Co.
2. Tru-Weld/Tru-Fit Products Corporation
3. Hilti, Inc.

C. Mechanical Fasteners

1. Hilti, Inc.
2. ITW Buildex

D. Sidelap Connectors

1. Hilti, Inc.
2. ITW Buildex
3. Elco Textron

2.02 MATERIALS

A. Steel for Composite Metal Deck:

1. Formed from galvanic steel sheets conforming to ASTM A653. Size of deck is to follow SDI requirements for thickness and tolerances.

2. Minimum yield strength of 40,000 psi.

3. Formed with integral locking lugs.

4. Formed with deformations to provide bond with concrete.

5. Deck to receive sprayed fireproofing shall be free of lubricants or oils that would impair the adhesion of the fireproofing material.

6. Metal deck that is not exposed to view with architectural paint finish shall have integral hanger tabs providing an approximate 0.5% uniformly distributed open area. The hanger tabs are used for venting purposes only.

B. Steel for Roof Deck:

1. Formed from galvanic steel sheets conforming to ASTM A653. Size of deck is to follow SDI requirements for thickness and tolerances.

2. Minimum yield point of 40,000 psi.

3. Deck to receive sprayed fireproofing shall be free of lubricants or oils that would impair the adhesion of the fireproofing material.

C. Acoustical Cellular Roof Deck:

1. Cellular Deck and Metal Accessories: Sheet steel conforming to ASTM A 611 Grade C or ASTM A 446 Grade A. Before fabrication, sheet steel shall receive ASTM A653, Class G 90, hot dip zinc coating. Accessories shall be fabricated of not lighter than 18 U.S. Standard Gauge sheet steel.

   a. Deck for Composite Construction: Galvanized deck uniformly deformed to insure a mechanical bond between concrete and steel. Metal accessories shall be galvanized.

2. Acoustical Deck: Cellular deck with bottom flat plate perforated directly below each cell and with deck manufacturer's standard sound absorbing elements consisting of an inert, non-organic, mineral fiber material which will produce a Noise Reduction Coefficient (NRC) of 0.70.

3. Self-Drilling Fasteners: No. 12-14 x 3/4 inch, hex washer head, self-drilling fastener with pilot point.

4. Cellular steel deck units shall be formed to provide smooth, completely enclosed raceways conforming to UL requirements. Deck units shall be carefully cut to required lengths at the factory within UL tolerances for length and squareness, to insure proper abutting of units at the site.

   a. Length: Furnish units of continuous length over 3 spans wherever possible.

   b. For steel deck properties and depth see contract drawings.

5. For cellular units, the ratio of distance between stiffened edges to metal thickness of any top horizontal surface shall not exceed 120.

6. Deck units shall have a continuous reinforcing web between top and bottom cell elements where cells are cut longitudinally 1-1/2 inches or more away from the vertical web.

7. Erect cellular steel deck and accessories under the direct supervision of the manufacturer's field advisor.

D. Miscellaneous Steel Shapes:

1. Shall conform to the requirements of ASTM A36 or A992. Members to receive sprayed

fireproofing shall be unprimed and free of lubricants or oils that would impair the adhesion of the fireproofing material.

E. Shop Finish:

1. Metal deck: Steel sheet shall receive before being formed a coating of zinc conforming to ASTM A653 coating class G60 (both sides). Metal deck exposed to view, such as in the gymnasium, shall be cleaned and phosphatized prior to priming. Primer shall be applied in the shop and shall be structural steel primer paint applied at a rate of 0.6 Mils DFT minimum). Salt spray resistance of paint shall be 100+ hours when tested in accordance with ASTM B117.

2. Steel roof deck: Steel sheet shall receive before being formed a coating of zinc conforming to ASTM A653 coating class G90 (both sides). Roof deck exposed to view, such as in the gymnasium, shall be cleaned and phosphatized prior to priming. Primer shall be applied in the shop and shall be structural steel primer or coil coating paint applied at a rate of 0.6 Mils DFT minimum). Salt spray resistance of paint shall be 100+ hours when tested in accordance with ASTM B117.

F. Metal Deck Accessories (cants, pour stops, closure pieces, etc.):

1. Shall conform to the requirements of ASTM A653, coating class G60. Unless a thicker gage is required by design considerations, such as at cantilever edge conditions, minimum thickness shall be same gage as metal deck. Accessories to receive sprayed fireproofing shall be free of lubricants and oils that would impair the adhesion of the fireproofing material.

G. Headed Stud Type Shear Connector:

1. Shall conform to the provisions of ASTM A108, meeting chemical requirements of ASTM A29, Grade 1010 through 1020, and Article 7.2.6 of AWS D1.1. Welded studs shown on the Drawing are the Basis of Design.

2. Mechanical Studs of equivalent strength to welded studs. Unless shown on the Contract Drawings, the size, number of and location on the beam shall be in accordance with the manufacturer's published data and supported by test data.

   a. Mechanical shear connectors shall be Hilti X-HVB Shear Connectors installed with Hilti X-ENP-21 HVB powder-actuated fasteners.

H. Welds and Fasteners:

1. Welds:

   a. Material: Welding electrodes shall conform to either E60XX or E70XX classification of AWS A5.1 as selected by the licensed welder depending on the gauge of steel deck and strength of steel member being welded to and is subject to approval by the Engineer of Record.

   b. Weld Washers: Use on steel roof deck thinner than 22 gauge

2. Mechanical Fasteners:

   a. Material: AISI 1070 modified
   b. Hardness: Minimum Rockwell Hardness C 54.5
   c. Design and Manufacture: Knurled shank with forged ballistic point. Manufacturing process shall ensure steel ductility and prevent development of hydrogen embrittlement.
   d. Washers:

1) For structural steel framing: Minimum 15 mm (0.591 in.) steel washers
2) For steel bar joist framing: Minimum 12 mm (0.472 in.) steel washers

e. Corrosion Resistance:

1) For steel roof decks with waterproofing membrane: 5 micron zinc electroplated in accordance with ASTM B 633 SC1 Type III
2) For exposed steel roof decks: Minimum AISI 304 stainless steel sealing caps with bonded neoprene washer shall be installed over each fastener

f. Design Requirements:

1) ICC-ES AC43 or SDI method for diaphragm shear strength and stiffness
2) FM wind uplift resistance
3) UL fire classification

g. Approved Types

1) For use with structural steel framing supports with top flange thickness 1/4 in. or thicker:

a) Hilti X-ENP-19 L15 (1/4 in. or thicker)
b) ITW/Ramset SP

2) For use with steel bar joist supports with top chord or flange thickness 1/8 in. to 3/8 in.:

a) Hilti X-EDNK22 THQ12 (1/8 in. up to and including 1/4 in.)
b) Hilti X-EDN19 THQ12 (3/16 in. up to and including 3/8 in.)
c) ITW/Ramset 1500K and 1600WK

I. Sidelap Connectors:

1. Acceptable types of sidelap connectors:

a. Top or side seam welds

1) 1½" long fillet welds in accordance with AWS D1.3 procedures.

b. Mechanical sidelap connectors

1) Drive mechanical sidelap connectors completely through adjacent lapped roof deck sheets to achieve positive engagement of adjacent sheets with a minimum of three thread penetration.
2) Material: ASTM A510 Grade 1022
3) Hardness: Minimum Vickers Surface Hardness of 450 HV0.3
4) Design and Manufacture: Hex washer head undercut with reverse serrations; self-piercing or stitch point at center

5) Corrosion Resistance:

a) steel roof decks with waterproofing membrane: 5 micron zinc electroplated in accordance with ASTM B633 SC1 Type III.
b) For exposed steel roof decks: AISI 410 or 304 stainless steel with bonded neoprene washer.

6) Design Requirements:

a) ICC-ES AC43 or SDI method for diaphragm shear strength and stiffness
b) FM wind uplift resistance

7) Approved Types:

a) Hilti S-SLC01 M HWH Sidelap Connector
b) Hilti S-SLC02 M HWH Sidelap Connector
c) Hilti S-MD 10-16x3/4 HWH #3 Stainless Steel Screw
d) Elco Textron
e) ITW Buildex Teks

c. Button punches

1) Standard or proprietary type button punches shall be deep and positively engage the male and female side edges of adjacent interlocking deck sheets in accordance with steel deck manufacturer recommendations

2) Approved Types

a) Wheeling Corrugating Gator Crimp
b) Verco Manufacturing Punchlok

J. Galvanizing Repair Paint

1. Shall conform to the requirements of ASTM A780 and comply with Military Specification MIL-P-21035.

K. Deck Fasteners (if used)

1. Deck fasteners of a type that will provide equal or greater uplift resistance than a 3/4" puddle weld.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin placement of metal deck until all surfaces and members are deemed acceptable to receive the deck. Do not proceed with Work until any unsatisfactory conditions have been corrected to the satisfaction of the deck installer.

3.02 ERECTION

A. General

1. Care should be taken to avoid overloading the supporting structural elements when placing bundles of metal deck or other construction loads on floors and roof.

2. Do not use floor deck units for storage or working platforms until they are permanently secured.

3. Employ a Licensed Professional Engineer or Land Surveyor to ensure accurate erection of the deck and end closures.

B. Metal Deck and Accessories Installation

1. Lay units in strict accordance with manufacturer's instructions and requirements and as shown on Drawings.

2. Adjust units in place before permanent fastening and accurately align end to end. Rectify inaccuracies in alignment and level of bearing before units are finally placed.

3. Provide proper bearing at all supports. Metal deck must be placed to bear fully on surface of beam flanges.

4. Provide angle and channel supports for metal deck at locations where deck cannot be properly seated due to obstructions by structural connections and as shown on Drawings. Coordinate with mechanical trades to adjust supports at columns if required to permit items to pass adjacent to column.

5. Anchor deck to steel member by welding directly through the bottom of the rib at all structural supports by welds not less than 3/4" in diameter or by using powder driven fasteners of equivalent strength, spaced not more than 12" across the width of the unit. All welds shall be of uniform size and appearance and free of pinholes, porosity, undercutting or other defects. Welds shall be free of sharp points or edges. Mechanical fasteners shall be fully engaged and washer snug and holding deck without damage. Where two units abut, each unit shall be so fastened to the steel framing. Add additional welds or fasteners where found defective.

6. Fasten side laps of adjacent units between supports by crimping or mechanically fastening with sheet metal screws of size and spacing required by manufacturer or as indicated on the Drawings to provide diaphragm strength required by seismic design. In no case shall fasteners exceed two feet. Fasteners for exposed to view roof deck shall be the minimum length possible to to ensure an aesthetic appearance.

7. Furnish, install, and weld in position all accessories, including pour stops, closures, cant strips, etc., where required.

    a. Furnish sheet metal pour stops and closures for open ends of all cell raceways at columns, walls, and openings shown on Drawings. Pour stop gage is to be selected by manufacturer based on overhang. Revise gage if survey shows overhang exceeds that designed. Provide additional supports to strengthen pour stop at wedge inserts if required.
    b. Provide sheet steel cover plate (or closure tape) as required to close panel end conditions where panels change direction or abut.
    c. Furnish material for column closures to close openings between panels and structural columns.
    d. Provide welding hole cover, with friction fastening, to close welding access holes when required.
    e. Provide smooth form wood edge at locations where edge of deck will be exposed to view, such as at stairwells.

C. Stud Shear Connector Welding:

1. Weld studs to steel beams through the steel deck with automatically-timed stud welding equipment.

2. Stud welding shall conform to the requirements of AWS D1.1 with respect to workmanship, quality control, and field inspection.

3. Manufacturer shall supply guidance and instruction in proper installation method

4. Additional requirements for stud welding with metal deck:

    a. Top flanges of beams must be free of paint, heavy rust, millscale, dirt, ice and water, and any other material that will interfere with the welding operation.
    b. Metal deck must be free of dirt, ice, water, and other foreign materials that will interfere with the welding operation.

D. Cutting, Drilling, and Reinforcing of Openings:

1. Where predetermined openings (such as stairs, elevators, etc.) are framed by structural steel beams on all sides (shown on the Drawings), the metal deck shall be engineered by the manufacturer to fit these conditions.

2. Any opening which is not framed by structural steel beams on all sides, and which is required in steel decking, shall be cut by the respective trades requiring it.

3. Reinforcing of Openings in Steel Deck

    a. Holes 6" or less in dimension need not be reinforced.
    b. Holes greater than 6" but less than 30" in any dimension shall be reinforced by the General Contractor as shown on the Structural Contract Drawings.

E. Field Touch Up

1. Clean scarred and rusted areas in galvanizing after deck installation is completed and paint welds and the scarred and rusted areas with the galvanizing repair paint. Apply in accordance with the manufacturer's instructions.

3.03 TOLERANCES

A. Edge of metal deck is to be within a tolerance of 1/4” of theoretical, set to a survey line, to ensure proper installation of masonry and installation of relieving angles. Where deck is found to be out of tolerance, make corrections and resurvey prior to placement of concrete.

3.04 FIELD QUALITY CONTROL

A. Welding/fastening of metal deck and shear studs is subject to Special Inspection and Testing and is included as part of the Quality Control Work of Section 051200 and includes but is not limited to.

1. Weld sizes and pattern.

2. Mechanical fastener placement location and washer condition.

3. Clamping of steel roof deck to supporting steel framing

B. The Contractor shall engage an engineer licensed in the state of New York to check tolerances and inspect the erection.

C. Contractors Surveys:

1. Provide survey of locations of edge of deck with respect to theoretical edge of deck and building survey line. Indicate discrepancies between actual installation and Contract Documents. Surveys are to be submitted in a timely manner such that corrections can be made prior to placement of concrete. Do not proceed with placing concrete until the pour stop locations are corrected.

3.05 CLEANING

A. Metal deck and accessories to receive sprayed fireproofing shall be clean of dust, grease, excessive oils, loose materials, and any other matter which would impair the adhesion of the fireproofing material to the deck and accessories.

END OF SECTION

LIST OF SUBMITTALS

SUBMITTAL	**DATE SUBMITTED**	**DATE APPROVED**
Product Data:	_____	_____
1. Stud shear connector 2. Deck fastener (if used) 3. Primer Paint		
Shop Drawings:	_____	_____
1. Metal deck drawings 2. Calculations		
Certificates:	_____	_____
1. Deck materials 2. Welders qualifications & license 3. UL for materials 4. Steel deck manufacturer is SDI member		
Manufacturer's Instructions:	_____	_____
1. Deck installation		
Qualifications	_____	_____
1. Manufacturer 2. Erector 3. Welder 4. Mechanical fastener technician		
Survey:	_____	_____
1. Deck edges		

* * *

DIVISION 05 – METALS

SECTION 054000 – COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.01 GENERAL

A. Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of cold formed framing as indicated on the drawings and specified herein. Shapes, sizes and accessories as specified and detailed shall establish the type of units and materials to be used to provide the functional and finished aesthetic requirements desired.

B. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Extent of cold-formed metal framing is shown on drawings.

B. Types of cold-formed metal framing units include the following:

1. Load-bearing and non-load bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Floor joist framing.
4. Roof rafter framing.
5. Ceiling joist framing.
6. Soffit framing.

C. Related Sections include the following:

1. Section 033000 – Cast-in-Place Concrete
2. Section 042000 – Unit Masonry
3. Section 051200 – Structural Steel Framing
4. Section 055000 – Metal Fabrications
5. Section 061000 – Rough Carpentry
6. Section 062000 – Finish Carpentry
7. Section 072100 – Building Insulation
8. Section 092900 – Gypsum Wallboard

1.03 REFERENCES

A. AISI – Specification for the design of cold-formed steel structural members, code of standard practice (COSP).
B. ASCE 7 – Minimum design loads for building or other structures.
C. ASTM A90 – Standard test method for weight (mass) of coating on iron and steel articles with zinc or zinc alloy coatings.
D. ASTM A370 – Standard test methods and definitions for mechanical testing of steel products.
E. ASTM A570 – Standard specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
F. ASTM A653 – Standard specification for steel sheet, zinc coated (galvanized) or zinc iron alloy coated (galvannealed) by the hot-dip process.
G. ASTM A780 – Standard practice for repair of damaged and uncoated areas of hot-dip galvanized coatings.
H. ASTM A924 – Standard specification for general requirements for steel sheet, metallic coated by

the hot-dip process.

I. ASTM A1003 – Standard specification for steel, sheet, cold rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability.
J. ASTM A1008 – Standard specification for steel, sheet and strip, hot rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability.
K. ASTM 1011 – Standard specification for steel, sheet and strip, hot rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability
L. ASTM B633 – Standard specification for elctrodeposited coatings of zinc and iron on steel.
M. ASTM C754 – Specification for installation of framing members to receive screw attached gypsum wallboard, backing board or water resistant backing board.
N. ASTM C840 – Standard specification for application and finishing of gypsum board.
O. ASTM C955 – Standard specification for load bearing (tranverse and axial) steel studs, runners (tracks), and bracing or bridging for screw application of gypsum panel products and metal plaster bases.
P. ASTM C1007 – Standard specification for installation of load bearing (transverse and axial) steel studs and related accessories.
Q. ASTM C1513 – Standard specification for steel taping screws for cold formed steel framing connections.
R. ASTM E84 – Standard test method for surface burning characteristics of building materials.
S. ASTM E90 – Method for laboratory measurement of airborne sound transmission loss of building partitions.

1.04 DESIGN REQUIREMENTS

A. Fire Resistive Rating: Where fire rated construction is indicated on drawings, provide materials and construction that are identical to those assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

   1. Meet or exceed fire resistance requirements outlined under provisions of the GA-600 Fire Resistance Design Manual for wall and ceiling assemblies.

   2. Meet or exceed flame/fuel/smoke requirements of ASTM E84 surface burning characteristics for finish materials

B. Sound Transmission Characteristics: For specified wall assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.

C. AISI Specifications: Comply with AISI's current 'Specification for the Design of Cold-Formed Steel Structural Members' and the following for calculating structural characteristics of cold formed metal framing:

   1. CCFS Technical Bulletin: Current 'AISI Specification Provisions for Screw Connections'.

D. Fire Rated Assemblies: Where framing units are components of the assemblies indicated for a fire resistance rating, including those required for compliance with governing regulations, provide units which have been approved by governing authorities.

1.05 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Product Data: For each type of cold-formed steel framing product and accessory, submit the following information:

1. Manufacturer's product data, including manufacturer's technical data sheet.
2. ICC-ES Reports.
3. Material Safety Data Sheets.
4. Preparation instructions and recommendations.
5. Storage and handling requirements and recommendations.
6. Installation methods.

C. Structural Calculations (For Structural Load Bearing or Supporting Assemblies):

1. Submit structural calculations prepared by manufacturer for approval. Submittal shall be sealed by a Professional Engineer registered in the state in which the project is located.
2. Description of design criteria.
3. Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application.
4. Selection of framing components, accessories and welded connection requirements.
5. Verification of attachments to structure and adjacent framing components.
6. Engineer shall have a minimum of five (5) years experience with projects of similar scope.

D. Shop Drawings (For Structural Load Bearing or Supporting Assemblies):

1. Submit shop drawings prepared by the manufacturer showing plans, sections, elevations, layouts, profiles and product components locations, including anchorage, bracing, fasteners, accessories and finishes.
2. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3. Show connection details with screw types and locations, weld lengths and locations and other fastener requirements.
4. Where prefabricated or prefinished panels are to be provided, provide drawings depicting panel configurations, dimensions and locations.

E. Welders Certificates: Submit manufacturers certificates, certifying welders employed on work, verifying AWS qualifications within the previous 12 months.

F. Mill Certificates: Signed by steel sheet producer indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Materials shall be provided by a firm that is experienced in manufacturing cold-formed metal framing similar to that indicated for this Project and with a record of successful in-service performance.

1. Assumes responsibility for designing cold-formed metal framing and connections to comply with performance requirements. This responsibility includes preparation of Shop Drawings and design calculations by a qualified professional engineer.

B. Installer Qualifications: Work shall be installed by an experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Professional Engineer Qualifications: A professional engineer who is licensed to practice in the jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent. Engage a qualified Professional Engineer to prepare design calculations, shop drawings

and other structural data.

D. Mock-Up: When requested by the Architect or owner, contractor shall provide a 4'x4' mock-up for evaluation of workmanship for each type of cold formed metal framing specified/required by the project.

1. Construct areas designated by Architect.
2. Do not proceed with remaining work until material, details, and workmanship are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.
4. Demolish mock-up at a time as a designated by the Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturers unopened packaging until ready for installation.

B. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per AISI COSP Section F3.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturers absolute limits.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Marino/WARE
2. ClarkDietrich Building Systems.
3. CEMCO; California Expanded Metal Products Co.

B. Source Limitations: Provide components and materials specified in this section form a single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified Professional Engineer registered in the state in which the project is located to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As noted on the Drawings.

2. Deflection Limits:

a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
c. Interior Non-Load Bearing Assemblies: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.

d. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
e. Floor Joist Framing: Vertical deflection of 1/360 for live loads and l/240 for total loads of the span.
f. Roof Rafter Framing: Vertical deflection of 1/120 of the horizontally projected span for live loads.
g. Ceiling Joist Framing: Vertical deflection of 1/120 of the span for live loads and 1/240 for total loads of the span.
h. Gypsum Board: 1/360 of span under total design loads.
i. Exterior Insulation Finish Systems: 1/360 of span under total design loads.
j. Plaster or Stucco: 1/360 of span under total design loads.
k. Brick Veneer: 1/600 of span under total design loads.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1/2 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.03 COLD-FORMED STEEL FRAMING

A. System Components: With each type of metal framing required, provide manufacturer's standard U-shaped steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system as follows:

1. Load-Bearing Wall Framing:

a. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
b. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges.
c. Headers and Jambs - Heavy-Duty Stud: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with

stiffened flanges.

d. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges.
e. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated.

2. Interior Non-Load Bearing Wall Framing:

a. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
b. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges.
c. Vertical Deflection Clips, Interior: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
d. Deflection Track and Firestop Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thicknesses not less than indicated for studs and in width to accommodate depth of studs.
e. Slotted Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; punched with vertical slots in both legs. Studs should be positively attached to deep-leg track using vertical slots while allowing free vertical movement. Legs designed to support horizontal and lateral loads and transfer them to the primary structure.
f. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure. Install a continuous row of bridging, composed of 1-1/2-inch cold-formed channel secured to each stud with clip angle, or bridging, or spacer bar, at upper-most knockout, not more than 12 inches from top of wall.
g. Firestop Track: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
h. Bridging and Spacer Bar as required.

3. Exterior Non-Load Bearing Wall Framing:

a. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
b. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges.
c. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
d. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
e. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1) Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure.
2) Inner Track: Of web depth indicated.

f. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud

from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

4. Floor Joist Framing:

    a. Steel Joists: Manufacturer's standard cold-formed steel joists, of web depths indicated, punched, with enlarged service holes, with stiffened flanges.
    b. Steel Joist Track: Manufacturer's standard cold-formed steel joist track, of web depths indicated, unpunched, with unstiffened flanges.

5. Roof Rafter Framing:

    a. Steel Rafters: Manufacturer's standard cold-formed steel joists used as rafters, of web depths indicated, punched with enlarged holes, with stiffened flanges.

6. Ceiling Joist Framing:

    a. Steel Ceiling Joists: Manufacturer's standard cold-formed steel joists, of web depths indicated, punched with enlarged service holes, with stiffened flanges.

7. Soffit Framing:

    a. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges.

B. Materials and Finishes:

1. For 16-gauge and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi; ASTM A 653, A 570, or A 611.

2. For 18-gauge and lighter units, which will only be attached mechanically, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 37,000 psi; ASTM A 653, A 570, or A 611.

C. Provide galvanized finish to metal framing components complying with ASTM A525 for minimum G90 coating.

1. Finish of installation accessories to match that of main framing components, unless otherwise indicated.

D. Hat Shaped Furring Channels: 22 gauge with minimum 1/2” wide flanges. Minimum depth 3/4” unless otherwise noted on drawings.

E. Framing Accessories:

1. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

2. Provide accessories of manufacturer’s standard thickness and configuration, unless otherwise indicated, as follows:

    a. Supplementary framing.
    b. Bracing, bridging and solid blocking.
    c. Web stiffeners.
    d. Utility angles.
    e. Rigid clips.

f. End clips.
g. Foundation clips.
h. Gusset plates.
i. Stud kickers and knee braces.
j. Joist hangers/Bridle hangers.
k. Hole reinforcing plates.
l. Backer plates.
m. U-Flex track.
n. Katz blocking.
o. BridgeRite clips.
p. Breakaway clips.

2.04 ANCHORS, CLIPS AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 and as indicated on drawings.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.05 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.06 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with

connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section

1. Fabricate framing assemblies in jig templates to hold members in proper alignment and position and to assure consistent component placement.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Framing components may be prefabricated into panels prior to erection. Perform lifting of prefabricated panels in a manner to prevent damage or distortion. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses.

C. Mechanical Fasteners: ASTM C1513, corrosion resistant coated, self- drilling, self-tapping steel drill screws. Minimum two (2) screws per connection.

D. Fabrication Tolerances: Fabricate assemblies level, plumb and true to line, to a maximum allowable tolerance variation of 1/8 inch in 10 feet, and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Pre-installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

1. Verify that concealed wood/sheet steel blocking has been installed the proper locations.

B. Examine substrates to which metal framed construction attaches or abuts. Verify pre-set hollow metal frames, cast in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of wall framing. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Manufacturer's Instructions: Install metal framing systems in accordance with ASTM C 1007 and manufacturer's printed or written instructions and recommendations, unless otherwise indicated.

B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners. Provide fasteners at corners and ends of tracks.

1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
2. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
3. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim, and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

C. Installation of Wall Stud System: Secure studs to top and bottom runner tracks by screw fastening at both inside and outside flanges.

1. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.
2. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of the stud system. Independently frame both sides of joints.
3. Install horizontal stiffeners in the stud system, spaced (vertical distance) at not more than 4'-6" o.c. Mechanically fasten at each intersection.
4. Fasten hole reinforcing plates over web penetrations that exceed the size of the manufacturer’s standard punched openings.

D. Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true to line joints.

1. Step in face and jog in alignment between panels not to exceed 1/16".

E. Insulation: Install insulation in exterior framing members, headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

3.04 LOAD BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing or as indicated on Shop Drawings.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-

framing system,

3.05 NON-LOAD BEARING WALL INSTALLATION

A. Install framing system components in accordance with spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16” o.c. unless otherwise indicated on the drawings.
2. Multilayer Application: 16” o.c. unless otherwise indicated on the drawings.
3. Tile Backing Panels: 16” o.c. unless otherwise indicated on the drawings

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 – Building Insulation, vertically and hold in place with Z-shaped furring members spaced 24” o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.06 EXTERIOR NON-LOAD BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as indicated on drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing studs or infill studs and anchor to building structure.
4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

    a. Install solid blocking at centers indicated on Shop Drawings.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.07 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as indicated on the drawings.

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:

1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.08 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.09 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings and all welded areas on fabricated and installed cold-formed metal framing with galvanized repair paint, according to ASTM A 780 and manufacturer’s written instructions. Wire brush slag off of all welds.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 061000 – ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.

1.02 SUMMARY

A. Types of work in this section include rough carpentry for:

1. Framing with dimensional lumber as shown on the drawings and as specified herein.

2. Plywood, OSB, particleboard panels and/or other sheathing as shown on the drawings and as specified herein.

3. Wood blocking, nailers and/or sleepers.

1.03 RELATED SECTIONS

A. Section 061643 – Exterior Gypsum Sheathing
B. Section 061713 – Laminated Veneer Lumber
C. Section 062000 – Finish Carpentry
D. Section 072100 – Building Insulation
E. Section 072113 – Ultra Wall Insulation and Air Barrier System
F. Section 072423 – Direct Applied Exterior Finish Systems
G. Various Division 07 Roofing Specifications
H. Various Division 09 Finishes Specifications
I. If designated as a LEED project, then also:
   1. Section 013563 – LEED Requirements
   2. Section 017419 – Construction Waste Management

1.04 REFERENCES

A. AWPA – (American Wood Preservers Association) – All Timber Products Preservative Treatment by Pressure Process.

B. APA – American Plywood Association.

C. AITC – American Institute of Timber Construction.

D. US Department of Commerce (DOC):

1. DOC PS 1 – Performance Standard for Structural Plywood.
2. DOC PS 2 – Performance Standard for Wood-Based Structural Panels.

1.05 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.

B. Exposed Framing: Framing not concealed by other construction.

C. Dimensional Lumber: Lumber of 2 inches nominal or greater, but less than 5 inches nominal in least dimension.

D. Timber: Lumber of 5 inches nominal or greater in least dimension.

1.06 QUALITY ASSURANCE

A. All materials shall be provided and all work shall be performed in accordance with the NYS Building Code requirements (current version).

B. Lumber shall be certified by the following authorities/grading agencies:

1. NELMA: Northeastern Lumber Manufacturers' Association.

2. NLGA: National Lumber Grades Authority.

3. RIS: Redwood Inspection Service.

4. SPIB: The Southern Pine Inspection Bureau.

5. WCLIB: West Coast Lumber Inspection Bureau.

6. WWPA: Western Wood Products Association.

7. FSC: Forest Stewardship Council.

1.07 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit a listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in forms of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

C. Evaluation Reports: For the following, from ICC-ES:

1. Wood-Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Plywood.
4. Engineered wood products.
5. Shear panels.
6. Power-driven fasteners.
7. Powder-actuated fasteners.
8. Expansion anchors.
9. Metal framing anchors.

D. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.

1. Preservative Treatment: For each type specified, include certification by treating plant stating

type of preservative solution and pressure process used, note amount of preservative retained, and conformance with applicable standards.

a. For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

b. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

E. LEED Submittals; for projects requiring LEED certification, submit the following additional information:

1. Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 – LEED Requirements.

2. Credit EQ 4.1: Manufacturers' product data for interior field-applied construction adhesive, including printed statement of VOC content in accordance with Section 013563 – LEED Requirements.

3. Credit EQ 4.4: Composite wood manufacturer's product data for each composite wood product used indicating that product's bonding agent contains no urea formaldehyde in accordance with Section 013563 – LEED Requirements.

4. Forest Certification for the following wood products; materials produced from wood obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

a. Dimensional lumber framing.

b. Plywood.

1.08 DELIVERY, STORAGE AND PRODUCT HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels flat with spacers between each bundle to provide for air circulation around stacks and under coverings.

PART 2 - MATERIALS

2.01 LUMBER, GENERAL

A. Lumber Standards: Manufacture lumber to comply with *"Voluntary Lumber Standard"* DOC PS20-10, or most current edition, and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

1. Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill..

2. Where nominal sizes are indicated, provide actual sizes required by DOC PS20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

3. Provide dressed lumber, S4S, unless otherwise indicated.

4. Plywood Standards: Comply with the latest edition of U.S. Product Standard PSI and APA performance standards.

5. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

B. Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:

1. SPIB: Southern Pine Inspection Bureau.
2. WWPA: Western Wood Products Association.

C. Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing and mill.

2.02 FRAMING LUMBER

A. For items of dimensional lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species, unless otherwise noted on the Construction Drawings.

1. Hem-fir (north); NLGA.

2. Mixed southern pine; SPIB.

3. Spruce-pine-fir; NLGA.

4. Hem-fir; WCLIB, or WWPA.

5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

6. Species group below includes hem-fir and spruce-pine-fir (south).

7. Western woods; WCLIB or WWPA.

8. Northern species; NLGA.

2.03 MISCELLANEOUS LUMBER

A. Provide wood for support or attachment of other work including cant strips, nailers, blocking, furring, grounds, stripping, rooftop equipment bases and support curbs, and similar members. Provide lumber sizes indicated, worked into shapes shown.

B. Grade: Standard grade light framing size lumber of any species or board size lumber as required. No. 3 Common or Standard grade boards per WCLIB or WWPA rules or No. 3 boards per SPIB rules.

2.04 PLYWOOD PANELS AND ROOF SHEATHING

A. Plywood must contain no urea-formaldehyde resins.

B. Telephone and Electrical Equipment Backing Panels: DOC PS1, Exposure 1, C-D Plugged, in thicknesses as indicated, not less than ½ inch nominal thickness.

C. Plywood Roof Sheathing: Exposure 1, Structural 1 sheathing.

1. Span Rating: Not less than 48/24.

2. Nominal Thickness: Not less than 23/32 inch.

2.05 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

1. Where rough carpentry work is exposed to weather, in ground contact, pressure-preservative treated, or in areas of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating, complying with ASTM A153.

2. Nails, brads and staples shall comply with ASTM F 1667.

3. Power-Driven fasteners shall comply with NES NER-272.

4. Wood Screws shall comply with ASME B18.6.1.

5. Lag Bolts shall comply with ASME B18.2.1.

6. Bolts: Steel bolts shall comply with ASTM A307, Grade A; with ASTM A563 hex nuts and, where so indicated, flat washers.

7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

a. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

b. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

B. Building Paper: Asphalt saturated felt, non-perforated conforming to ASTM D226.

C. In the absence of requirements of section 072713, provide a self-adhering vapor-permeable air barrier membrane; Blueskin Breather manufactured by Henry; a self-adhering membrane consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:

1. Air leakage: <0.002 CFM/ft2 @ 1.6 lbs/ft2 to ASTM E283-91.

2. Water vapor permeance: 37 perms to ASTM E 96.

3. Membrane Thickness: 17 mils.

4. Low temperature flexibility -40 degrees F: Pass to ASTM D3111.

5. Hydrostatic Water Resistance: 18 psi ASTM D751 Procedure

D. Sill Sealer Gaskets: Glass fiber resilient insulation fabricated in strip form for use as a sill sealer; 1" nominal thickness compressible to 1/32"; selected from manufacturer's standard widths to suit width of sill members indicated; in rolls of 50' or 100' in length.

E. Water-Repellent Preservative: (for exposed ends of posts and beams, not for treating cuts in preservative-treated lumber): NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

F. Construction Adhesive: Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.06 METAL FRAMING ANCHORS

A. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or engineered-approved equals by one of the following:

1. Simpson Strong-Tie Co., Inc.
2. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those indicated of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet, complying with ASTM A 653, G60 (Z180) coating designation.

D. Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges at least 85 percent of joist depth.

1. Thickness: 0.062 inch.

E. I-Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.

1. Thickness: 0.062 inch.

F. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

1. Strap Width: 1-1/2 inches.
2. Thickness: 0.062 inch.

G. Bridging: Rigid, V-section, nail-less type, 0.050 inch thick, length to suit joist size and spacing.

H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

1. Width: 1-1/4 inches.
2. Thickness: 0.062 inch.
3. Length: As indicated.

I. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fasteners to side of rafter or truss, face of top plates, and side of stud below.

J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

1. Bolt Diameter: 3/4 inch.
2. Width: 3-3/16 inches.
3. Body Thickness: 0.138 inch.
4. Base Reinforcement Thickness: 0.108 inch.

M. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches (29 mm) wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.

N. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

2.07 FIRE RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce products with the following fire-test-response characteristics:

1. Flame-spread index of not greater than 25 when tested according to ASTM E 84.

B. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.

C. Exterior-Type Fire-Retardant Treatment: Organic-resin-based formulation that shows no increase in flame spread of treated material after being weathered according to ASTM D 2898, Method A.

D. Kiln-dry material after treatment to levels required for untreated material. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

E. Acceptable pressure-impregnated products include Hoover’s Pyro-Guard for interior applications and Exterior Fire-X for exterior applications.

2.08 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: Where lumber or plywood is indicated as "Trt-Wd" or "Treated," or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX). Mark each treated item with the AWPB Quality Mark Requirements, and with the quality mark of an inspection agency approved by the ALSC Board of Review.

1. Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2, acceptable to authorities having jurisdiction and containing no arsenic or chromium. After

treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Do not use material that is warped or does not comply with requirements for untreated material. Treat indicated items and the following:

a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
d. Wood framing members less than 18" above grade, in crawl spaces or unexcavated areas.
e. Wood floor plates that are installed over concrete slabs-on-grade.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Discard units with material defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

B. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.

C. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other work.

D. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

1. Unless otherwise indicated on the Construction Drawings, framing shall be at 16” centers.

E. Metal Anchors for Engineered Wood Products (where applicable): Install metal anchors to comply with manufacturer's written instructions.

F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.

2. Use copper naphthenate for items not continuously protected from liquid water.

H. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Comply with Table 2304.10.1 – “Fastening Schedule” in ICC’s International Building Code. Provide all blocking and framing as indicated and as required in order to support facing materials, fixtures, specialty items, and trim.

I. Use common wire nails, except as otherwise indicated; use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

J. Do not splice structural members between supports.

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Provide wherever shown and where required for attachment to other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrate as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Provide permanent grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.03 WALL AND PARTITION FRAMING

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness, whose widths equal that of studs. Fasten plates to supporting construction.

1. Space wood studs at 16 inches o.c., unless otherwise indicated.

2. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches high, using members of 2-inch nominal thickness, and of same width as wall or partitions.

B. Construct corners and intersections with three (3) or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb (jack) studs.

1. For load-bearing walls, provide double-jamb (jack) studs for openings 60 inches and less in width, and triple-jamb (jack) studs for wider openings. Provide headers of depth indicated on the drawings.

D. Provide diagonal bracing in walls, at locations indicated, full-story height, unless otherwise indicated.

3.04 FLOOR JOIST FRAMING

A. Space joists at 16 inches o.c., unless otherwise indicated.

1. Set each joist with crown up.

2. Provide continuous horizontal blocking at mid-span of joists, using members of same nominal size of joists.

B. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of joists.

1. Provide double-joists, nailed together, directly beneath non-bearing partition walls when joist run parallel to said walls.

3.05 RAFTER FRAMING

A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut ridge, place directly opposite each other and nail to ridge member, or use metal ridge

hangers.

1. Space wood rafters at 16 inches o.c., unless otherwise indicated.

2. Set each rafter with crown up.

B. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.06 PLYWOOD SHEATHING

A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Install with the long dimension of the panel across supports, except where noted, and with panel continuous over two or more spans. Suitable edge support shall be provided where indicated on drawings (or in recommendations of the American Plywood Association) by use of panel clips, tongue-and-groove panels, or lumber blocking between joists. Panel end joints shall occur over framing. Allow 1/8-inch spacing at panel ends and 1/4-inch at panel edges, unless otherwise recommended by the panel manufacturer.

C. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.

D. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports, except that when supports are spaced 48 inches o.c. or more, space nails 6 inches o.c. at all supports. Use 6d common nails for panels 1/2-inch and less and 8d for greater thicknesses, except that when panels are 1-1/8 inch, use 8d ringshank or 10d common.

3.07 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 062000 – FINISH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions, Division 01 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Types of work in this section include finish carpentry for:

1. Exterior standing and running trim.
2. Interior standing and running trim.
3. Interior plywood.
4. Window stools & aprons.
5. Closet shelving.

B. Casework, cabinetry, countertops, and wainscot paneling systems are specified in other Division 06, Division 11, and Division 12 sections.

1.03 RELATED SECTIONS

A. Section 061000 – Rough Carpentry
B. Various Division 09 Finishes Specifications
C. If designated as a LEED project, then also:
   1. Section 013563 – LEED Requirements
   2. Section 017419 – Construction Waste Management

1.04 QUALITY ASSURANCE

A. Lumber: Comply with Voluntary Product Standard PS-20. Lumber shall bear grade and trademark of the association under whose rule it is produced.

1. Southern Forest Products Association (SFPA).
2. West Coast Lumber Inspection Bureau (WCLIB).
3. American Plywood Association (APA).
4. Western Wood Products Association (WWPA).
5. American Wood Preservers Bureau (AWPB).
6. National Woodwork Manufacturer's Association (NWMA).
7. National Hardwood Lumber Association (NHLA).
8. Architectural Woodwork Institute (AWI).
9. Wood Moulding and Millwork Producers (WM).

10. Forest Stewardship Council (FSC).

B. Plywood Grading Rules:

1. U.S. Product Standard PS 1-83 for Construction and Industrial Plywood.

2. American Plywood Association (A.P.A.).

C. Perform finish carpentry in accordance with AWI Quality Standards, "Custom" grade, unless otherwise noted.

1.05 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Submit shop drawings and product data for architectural woodwork. Indicate materials, component profiles, jointing details, finishes, and accessories.

1. If requested, provide 6” long samples of trim pieces.

C. LEED Submittals; for projects requiring LEED certification submit the following:

1. Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 “LEED Requirements”.

2. Credit EQ 4.1: Manufacturers' product data for interior field-applied construction adhesive, including printed statement of VOC content in accordance with Section 013563 “LEED Requirements”.

3. Credit EQ 4.4: Composite wood manufacturer's product data for each composite wood product used indicating that product’s bonding agent contains no urea formaldehyde in accordance with Section 013563 “LEED Requirements”.

4. Forest Certification for the following wood products; materials produced from wood obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

a. Finish lumber and moldings.

b. Finish plywood, veneers.

1.06 DELIVERY, STORAGE AND PRODUCT HANDLING

A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

B. Do not deliver finish carpentry materials, until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas.

C. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - MATERIALS

2.01 SEASONING

A. Moisture Content: Except grades and species having a definite moisture content limitation under established grading rules, lumber shall be kiln-dried to a maximum moisture content of twelve percent (12%).

2.02 EXTERIOR STANDING AND RUNNING TRIM

A. Trim shall be of sizes, configurations, and profiles as indicated on the drawings for the following applications.

1. Finished lumber.
2. Door and window casings.
3. Fascia, rake, and associated trim.
4. Other applications as may be detailed on the drawings.

B. Exterior applications shall be clear all-heart redwood, clear heart western red cedar, southern yellow pine, or black locust, unless otherwise noted on the drawings as a different species or resin-based, hardboard, or composite material.

1. Provide WM grade P for opaque/painted finish.
2. Provide WM grade N for natural/stained finish.

2.03 INTERIOR STANDING AND RUNNING TRIM

A. Trim shall be of sizes, configurations, and profiles as indicated on the drawings for the following applications.

1. Finished lumber.
2. Door and window casings.
3. Wall base molding.
4. Chair rails.
5. Crown moldings.
6. Picture moldings.
7. Other applications as may be detailed on the drawings.

B. Interior softwood applications shall be select eastern white pine or sapwood birch; hardwood applications shall be white oak, red oak, or hard maple, unless otherwise noted on the drawings as a different species or resin-based, hardboard, or composite material.

1. Provide WM grade P for opaque/painted finish.

2. Provide WM grade N for natural/stained finish.

2.04 INTERIOR PLYWOOD

A. Exposed finished plywood applications shall utilize furniture-grade plywood of a face species coordinating with specified trim or as indicated on the drawings.

1. Provide Type II interior sound grade for opaque/painted finish.

2. Provide Type II interior grade A for natural/stained finish.

B. Thicknesses shall be as indicated on the drawings.

1. Shelving plywood shall be nominal 3/4” minimum.

C. Comply with PS 1-83. Interior plywood in proximity to water (toilet rooms, sinks, etc.): manufactured with exterior glue.

1. Plywood must contain no urea-formaldehyde resins.

2.05 WINDOW STOOLS & APRONS

A. Window stools shall be constructed of hardwood lumber species as indicated on the drawings. If no species is indicated, bids shall be based upon red oak.

1. Utilize nominal 1” board stock for widths of 7-1/4” or less. For wider applications, utilize nominal 5/4” board stock.

2. Exposed edges shall be bullnosed.

B. Aprons shall be of similar species as window stools and shall be wide enough to cover rough wood blocking or GWB edge transition beneath.

2.06 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide nails, screws, and other anchoring devices of the proper types, size, material, and finish for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications and reference AWI standard.

PART 3 - EXECUTION

3.01 PREPARATION

A. Condition materials to average prevailing humidity conditions in installation areas prior to installing.

B. See Section 061000 – Rough Carpentry for installation of recessed wood blocking.

C. Prime and backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section 099000 – Painting & Staining.

3.02 INSTALLATION

A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes, or patterns.

B. Product joints which are true, tight, and well nailed with all members assembled in accordance with the Drawings. Field sand all finish trim material smooth, except Cedar, to remove saw marks, raised grain, etc. Cut all corners square and ease slightly.

C. Jointing: Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints. Install trim in pieces as long as possible, jointing only where solid support is obtained.

1. Door and window casings shall be single lengths without splicing.

D. Fastening:

1. Install items straight, true, level, plumb, and firmly anchored in place.

2. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.

3. Nail trim with finish nails of proper dimension to hold the member firmly in place without splitting the wood.

4. Nail exterior trim with galvanized nails, making joints to exclude water.

5. On exposed work, set nails for putty.

E. Prime paint surfaces in contact with cementitious materials or separate with felt.

3.03 INSTALLATION OF OTHER ITEMS

A. Set items at locations shown, in perfect alignment and elevation, plumb, level, straight, true and free from rack, scribed to adjoining work.

B. Appearance: finished surface shall be free of tool marks.

3.04 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

A. Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.

B. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

C. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

D. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintain condition necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072100 – BUILDING INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of building insulation as indicated on the drawings and specified herein.

1. This Section includes the following:
   a. Continuous rigid board insulation at exterior wall construction and under metal wall panels.
   b. Rigid board insulation at perimeter foundation walls.
   c. Rigid board insulation at underside of floor slabs.
   d. Fibrous blanket insulation for thermal purpose, where indicated
   e. Miscellaneous batt insulation to maintain continuity of building thermal barrier
   f. Protective cover over insulation board prior to placement of backfill or concrete cover.
   g. Nailboard insulation used for roof decks.
   h. Roof insulation used for flat roof installations.

B. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

C. Related Sections include the following:

1. Section 033000 – Cast-in-Place Concrete Work
2. Section 042000 – Unit Masonry
3. Section 061000 – Rough Carpentry
4. Section 072113 – Ultra Wall Insulation and Air Barrier – for rigid board insulation at masonry cavity wall construction.
5. Section 078400 – Firestopping – for fire-stop and smoke-stop materials at voids around penetrations through fire-rated and smoke barrier wall and roof construction assemblies.
6. Section 084113 – Aluminum Entrances and Storefronts – for miscellaneous batt insulation required at periphery of storefront framing system.
7. Section 085113 – Aluminum Windows – for miscellaneous batt insulation required at periphery of windows.
8. Section 092900 – Gypsum Wall Board – for sound attenuation insulation, metal stud and drywall partition construction.
9. Section 095000 – Acoustic Ceiling Systems – for ceilings to receive thermal lay-in insulation.

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section and as listed in Section 014219.

B. Manufacturers:

1. Insulation systems shall be manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of insulation materials. Obtain insulation material through one source from a single manufacturer. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past five years.

C. Installers:

1. The installation work of this section shall be performed by one entity, an experienced contractor that employs installers and supervisors who are trained and authorized by manufacturer, with a minimum five years' record of successful installations on projects of similar scope.

D. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. ASTM A272: Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
b. ASTM C177: Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
c. ASTM C518: Steady-State Thermal Transmission Properties by Means of The Heat Flow Meter.
d. ASTM C578: Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.
e. ASTM C665: Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
f. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
g. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
h. ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
i. ASTM E119: Standard Test Methods for Fire Tests of Building Constructions and Materials.
j. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
k. ASTM E2178: 11 Standard Test Method for Air Permeance of Building Materials.
l. ASTM E2357: 11 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

2. International Code Council Evaluation Service (ICC-ES):

a. AC 71: Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water Resistive Barriers.

3. National Fire Protection Association (NFPA):

a. NFPA 285: Standard Fire Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

4. Federal Specifications (FS):

a. FS HH-I-521E: Insulation Blankets, Thermal Fiber, for Ambient Temperatures.

1.03 SUBMISSIONS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

B. Product Data: Manufacturers' data on each type of product furnished including:

1. Preparation instructions and recommendations.
2. Technical data and tested physical and performance properties of products.
3. Storage, handling requirements, and recommendations.

C. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values (aged values for plastic

insulations), densities, compression strengths, fire performance, perm ratings, water absorption ratings, and similar properties.

D. Samples for Verification:

1. Submit, to the job site, 6” x 6” samples of each type and thickness of insulation.
2. Submit appropriate sample of loose fill insulation.
3. Submit manufacturer’s verification that rigid insulation contains at least 20% combined post-consumer and post –industrial recycled content.
4. Submit manufacturer’s verification that batt insulation contains at least 30% combined post-consumer and post –industrial recycled content.
5. Submit manufacturer’s verification that cellulose insulation contains at least 85% combined post-consumer and post –industrial recycled content.

E. Mock-Up: If requested, provide a mock-up of materials proposed for use for review of workmanship. Accepted mock-ups may remain in place.

F. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this section. Agenda shall include materials proposed for use, sequence of construction and coordination with installation of adjacent and covering materials.

G. Certificates: Submit documentation signed by Manufacturer that products meet Quality Assurance Certification requirements of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered in their original, unopened packages or containers; labels shall be intact, identifying contents, manufacturer, brand name, thermal values and applicable standards. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources.

B. Store all materials in a single location protected from weather, moisture, and open flame or sparks in dry locations with adequate ventilation, and in such a manner to permit easy access for inspection and handling.

1. In the event the extruded polystyrene insulation board becomes wet, wipe dry prior to installation.

2. In the event the batt or blanket insulation becomes wet, remove it from the jobsite.

C. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

D. Comply with manufacturer's written recommendations for handling, storage, and protection during installation.

E. Warning: Rigid insulation is combustible and may constitute a fire hazard; adequate protection shall be provided in accordance with National Fire Protection Association (NFPA) standards or the authority having jurisdiction.

F. Cover and protect insulation with light colored or white opaque covering while in storage; sunlight causes discoloration and deterioration that impairs adhesive bonding.

1.06 FIELD CONDITIONS

A. Ambient Conditions:

1. Apply products within the range of ambient and substrate temperatures recommended by manufacturer.

2. Protect substrates from environmental conditions that affect insulation performance.

1.07 WARRANTY

A. Provide manufacturer's standard limited warranty against manufacturing defects.

B. Provide Manufacturer's Lifetime Limited Warranty for ASTM C578 performance properties including retaining 90% thermal performance for the life of the product.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

A. General: Design is based on insulating materials as specified on drawings. The terminology used may include reference to specific manufacturers' proprietary products. Such reference shall be construed only as establishing the quality of the materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

B. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

C. Flame Spread & Smoke Developed Rating: All insulation materials shall have a flame spread rating of less than 25 and smoke developed not to exceed 450, in accordance with ASTM E-84.

2.02 EXTERIOR WALL SHEATHING CONTINUOUS INSULATION

A. Basis-of-Design has been specified around standard products as manufactured by Owens Corning®, www.owenscorning.com/insulation/commercial. Provide the named product or a comparable product similar or equal to "FOAMULAR® 150 XPS", extruded polystyrene insulation panels conforming to ASTM C578.

B. Description: Provide continuous extruded polystyrene insulation (sheathing), unfaced. Each insulation board must be labeled with manufacturer's name, product brand name, ASTM material specification reference, and identification of the third-party inspection agency used for building code qualification.

C. Performance Data:

1. Type X per ASTM C578 certified by independent third-party testing agency.

2. Compressive Strength: 15 psi, minimum per ASTM D1621.

3. Thermal Resistance (180 day real-time aging as mandated by ASTM C578, measured per ASTM C518 at mean temperature of 75F): R-5.0 per inch of thickness, with 90% lifetime limited warranty on thermal resistance.

4. Water Absorption (ASTM C272): Maximum.0.30 percent by volume.

5. Surface Burning Characteristics (ASTM E84): Flame spread less than 25; smoke developed less than 450, certified by independent third-party testing agency.

D. Materials:

1. Compliance certified by independent third party such as GREENGUARD Indoor Air Quality Certified® and/or GREENGUARD Gold℠.

2. Contains no HCFCs.

3. Zero ozone depleting blowing agent that has warming potential (100 years) of less than 750.

4. Recycled Content: Minimum 20%, certified by independent third party such as SCS Global Services.

5. Provide R-5 per inch of thickness; 1-1/2" thickness minimum at exterior wall locations or as indicated on the drawings thick; 48"x96"; square edge.

E. Fasteners:

1. Screw with Air & Water Sealing Washer: Provide preassembled screw and stress plate fasteners recommended by their manufacturer for securing extruded polystyrene (XPS) continuous insulation. Polymer or other corrosion-protected, coated steel screw fasteners for anchoring to sheathing and metal stud wall framing. Fastener length and size based on wall sheathing thickness and fastener manufacturer recommendation.

F. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

2.03 RIGID PERIMETER AND UNDER SLAB INSULATION

A. Basis-of-Design has been specified around standard products as manufactured by Owens Corning®, www.owenscorning.com/insulation/commercial. Provide the named product or a comparable product similar or equal to "FOAMULAR® 250 XPS", extruded polystyrene insulation panels conforming to ASTM C578.

1. Comparable similar or equal to product: DuPont™ Styrofoam™ Brand Square Edge Insulation as manufactured by DuPont de Nemours Inc.

B. Description: Provide continuous extruded polystyrene insulation unfaced. Each insulation board must be labeled with manufacturer's name, product brand name, ASTM material specification reference, and identification of the third-party inspection agency used for building code qualification.

C. Performance Data:

1. Type IV per ASTM C578 certified by independent third-party testing agency.

2. Compressive Strength: 25 psi, minimum per ASTM D1621.

3. Thermal Resistance (180 day real-time aging as mandated by ASTM C578, measured per ASTM C518 at mean temperature of 75F): R-5.0 per inch of thickness, with 90% lifetime limited warranty on thermal resistance.

4. Water Absorption (ASTM C272): Maximum.0.30 percent by volume.

5. Surface Burning Characteristics (ASTM E84): Flame spread less than 25; smoke developed less than 450, certified by independent third-party testing agency.

D. Materials:

1. Compliance certified by independent third party such as GREENGUARD Indoor Air Quality Certified® and/or GREENGUARD Gold℠.

2. Contains no HCFCs.

3. Zero ozone depleting blowing agent.

4. Recycled Content: Minimum 20%, certified by independent third party such as SCS Global Services.

5. Provide R-5 per inch of thickness; 2” thickness minimum at foundation wall and under slab locations or as indicated on the drawings thick; 48”x96”; square edge.

E. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

2.04 FIBERGLASS BLANKET INSULATION

A. Basis-of-Design has been specified around standard products as manufactured by Owens Corning® Insulating Systems, Toledo, OH 43659, www.owenscorning.com. Provide the named product or a comparable product similar or equal to “PINK Next Gen™ Fiberglas™ Insulation”.

1. Comparable similar or equal to product:

   a. CertainTeed Corporation.
   b. Johns Manville Corporation.

B. PINK Next Gen™ Fiberglas™ Insulation Unfaced Batt Insulation: ASTM C 665, Type I, preformed formaldehyde free glass fiber batt type, unfaced. Includes Unfaced PINK Next Gen™ Fiberglas™, Unfaced PINK Next Gen™ Fiberglas™ Sonobatts® Insulation and PINK Next Gen™ Fiberglas™ Sound Attenuation Batts (SAB) Insulation.

1. Noncombustible per ASTM E 136.
2. Flamespread less than 25, smoke developed less than 50 per ASTM E84.
3. ICC Building Code Construction Classification: All types.
4. Water vapor sorption, Maximum by weight: not more than 5 percent.

C. PINK Next Gen™ Fiberglas™ Insulation Kraft Faced Batt Insulation: ASTM C 665, Type II, Class C preformed formaldehyde free glass fiber batt type, Kraft paper faced one side. Includes Kraft faced PINK Next Gen™ Fiberglas™ Insulation, Kraft faced PINK Next Gen™ Fiberglas™ Sonobatts® Insulation and PINK Next Gen™ Fiberglas™ Insulation ProPink FastBatt Insulation.

1. ICC Building Code Construction Classification: III, IV, V.
2. Perm Rating: 1 perm maximum per ASTM E96.

D. Accessories: Provide accessories per insulating system manufacturer’s recommendations, including the following:

1. Tape: Polyethylene self-adhering type for Kraft faced insulation and bright aluminum self-adhering type for foil faced insulation.
2. Insulation Fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
3. Mechanical Insulation Fasteners: FM approved, corrosion resistant, size required to suit application.
4. Wire Mesh: Galvanized steel, hexagonal wire mesh.
5. Spindle Fasteners: Corrosion-resistant wire spindles.

6. Ventilation Baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces.

E. Performance Data:

1. Wood Frame Construction - Walls, R-Value: Per ASTM C518.

   a. R-11, 3 1/2 inch thickness, 15 inch or 23 inch width, 48 inch or 93 inch length.
   b. R-13, 3 1/2 inch thickness, 15 inch or 23 inch width, 48 inch or 93 inch length.
   c. R-15, 3 1/2 inch thickness, 15 inch or 23 inch width, 93 inch length.
   d. R-19, 6 1/2 inch thickness, 15 inch or 23 inch width, 48 inch or 93 inch length.
   e. R-21, 5 1/2 inch thickness, 15 inch or 23 inch width, 93 inch length.

2. Wood Frame Construction - Roof/Floor/Ceiling, R-Value: Per ASTM C518.

   a. R-19, 6 1/2 inch thickness, 15 inch or 19-1/4 inch or 23 inch width, 48 inch or 93 inch length.
   b. R-22, 6 3/4 inch thickness, 15 inch or 23 inch width, 48 inch length.
   c. R-25, 8 inch thickness, 15 inch or 23 inch width, 48 inch length.
   d. R-30C, 8 1/4 inch thickness, 15-1/2 inch or 23-3/4 inch width, 48 inch length.
   e. R-30, 10 inch thickness, 16 inch or 19-1/4 inch or 24 inch width, 48 inch length.
   f. R-38C, 10 1/4 inch thickness, 15-1/2 inch or 23-3/4 inch width, 48 inch length.

3. Metal Frame Construction, R-Value for Batt Insulation: Per ASTM C518.

   a. R-8, 2 1/2 inch thickness, 16 inch or 24 inch width, 96 inch length.
   b. R-11, 3 1/2 inch thickness, 16 inch or 24 inch width, 48 inch or 96 inch length.
   c. R-13, 3 1/2 inch thickness, 16 inch or 24 inch width, 48 inch or 96 inch length.
   d. R-15, 3 1/2 inch thickness, 16 inch or 24 inch width, 96 inch length.
   e. R-19, 6 1/2 inch thickness, 16 inch or 24 inch width, 48 inch or 96 inch length.
   f. R-21, 5 1/2 inch thickness, 16 inch or 24 inch width, 96 inch length.

F. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

2.05 NAILABLE RIGID ROOF INSULATION

A. Basis-of-Design has been specified around products as manufactured by Johns Manville or Architect approved equal. Provide the named product or a comparable product similar or equal to “Nailboard”, 4" overall thickness (R-20.5) closed cell polyisocyanurate foam core insulation board (ENERGY 3®) with 5/8” thick OSB.

B. Performance Data: (ENERGY 3® Foam Layer Only)

1. Type V per ASTM C1289.

2. Insulation Board Compressive Strength: 25 psi, minimum per ASTM D1621.

3. Long Term Thermal Resistance (LTTR): 20.5 R-Value, determined in accordance with CAN/ULC S770 at 75 deg F.

4. Water Absorption (ASTM C209): Maximum. 1.0 percent by volume.

5. Foam Core Surface Burning Characteristics (ASTM E84): Flame spread 20-30; smoke developed 55-250, certified by independent third-party testing agency.

C. Materials:

1. Orientated Strand Board (OSB): 5/8” thick with 1/8” routed edges.

2. ENERGY 3® closed cell polyisocyanurate foam core.

3. Standard board size to be 4’ x 8’ x 4" thick with an averaged R-Value of 20.5.

4. Rigid board shall be UL class A fire rated.

5. OSB must contain no urea-formaldehyde resins.

D. Fasteners:

1. All Nailboards must be mechanically attached with JM-approved fasteners Nail-Lok™ SD and Nail-Lok™ WD.

E. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

2.06 ROOF INSULATION BOARD

A. Basis-of-Design has been specified around products as manufactured by Johns Manville or Architect approved equal. Provide the named product or a comparable product similar or equal to “ENERGY 3®" 2” overall thickness (R-11.4) closed cell polyisocyanurate foam core insulation board or thickness as indicated on the drawings.

B. Performance Data: (ENERGY 3® Foam Layer Only)

1. Type II, Class , Grade 3 per ASTM C1289.

2. Insulation Board Compressive Strength: 25 psi, minimum per ASTM D1621.

3. Long Term Thermal Resistance (LTTR): 5.7 per inch, determined in accordance with CAN/ULC S770 at 75 deg F.

4. Water Absorption (ASTM C209): Maximum. 1.0 percent by volume.

5. Foam Core Surface Burning Characteristics (ASTM E84): Flame spread 20-30; smoke developed 55-250, certified by independent third-party testing agency.

C. Materials:

1. Standard board size to be 4’ x 8’ x 2" thick with an averaged R-Value of 11.4.

2. Rigid board shall be UL class A fire rated.

D. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

2.07 MATERIAL REQUIREMENTS

A. Batt / Blanket Insulation:

1. General Thermal Use Insulation: Preformed glass fiber, ASTM C665, Type I, unfaced without integral vapor barrier, friction fit type, 3-1/2” thick, with a thermal resistance (R-value) of R-11, unless thickness and R value are noted otherwise.

2. Wall Insulation: Types as called for on the drawings, preformed glass fiber, ASTM C665, Type I, unfaced without integral vapor barrier, friction fit type or ASTM C665, Type II, Class C, with Kraft-faced integral vapor barrier, as indicated on drawings, 6 1/4" thick, and a thermal resistance (R-value) of R-19, unless thickness and R value noted otherwise.

3. Ceiling Insulation: Preformed glass fiber, ASTM C665, Type I, unfaced without integral vapor barrier, friction fit type, 6 1/4" thick with a thermal resistance (R-value) of 19; 12" thick, and a thermal resistance (R-value) of R-38, unless thickness and R value noted otherwise.

4. Fire-Hazard Classification: When tested in accordance with ASTM E84.

   a. Concealed Installations:

      1) Flame Spread Rating: 25 maximum.
      2) Smoke Development Rating: 50 maximum.

   b. Exposed installations:

      1) Flame Spread Rating: 75 maximum.
      2) Smoke Development Rating: 450 maximum.

B. Staples: Electroplated or galvanized steel wire, type and size as recommended for application.

C. Wire-Up: Utilize 16 or 18 gauge line wire run diagonally or perpendicular to insulation every 18 to 24 inches.

D. Impaling Pin: Utilize impaling pins welded or fastened with adhesive. Impale insulation on anchor and secure with washer.

E. Miscellaneous Batt Insulation: Preformed glass fiber, ASTM C665, Type I, un-faced without integral vapor barrier membrane, field cut to appropriate size and thickness as required or indicated on Contract Drawings.

F. Protective Board Covering: 1/8" thick biodegradable hardboard, 1/4" minimum thickness of wood fiberboard, or other protective covering as approved by the Architect.

2.08 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be as selected by the Contractor, subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Carefully examine all the areas and conditions under which work of this section will be installed. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation in writing before proceeding. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

B. Insure that work of all preceding trades is completed prior to starting work of this Section. Verify adjacent materials are dry and ready to receive insulation.

C. Verify that wall, opening framing, bridging and structural bracing, and other framing support members and anchorage have been installed per requirements of the Project.

D. Installation of products specified in this Section constitutes acceptance of existing conditions and assumption of responsibility for satisfactory performance.

E. Verify that grade, excavation, fill, utilities penetrations, concrete accessories, and vapor retarding membrane have been installed per requirements of the Project.

F. Verify adjacent waterproofing membrane and materials are dry and ready to receive insulation.

G. Verify mechanical and electrical services within walls have been tested and inspected.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Insure surfaces are in uniform plane; true to dimensions; and free of waxes, oily films, grease, loose mortar chips, other items detrimental to installation.

3.03 INSTALLATION - GENERAL

A. Except as otherwise specifically directed by the Architect, install all building insulation in the size and thickness specified, in strict accordance with the manufacturer's instructions.
B. Install rigid insulation to maintain continuous and complete thermal protection for building spaces and elements.

C. Cut and trim rigid insulation; by means of saw, knife or other sharp tool, to neatly fit spaces and around mechanical, electrical and other items which protrude through plane of insulation. Butt edges and ends tight. Use only rigid insulation free of broken or chipped edges.

D. Installation of Perimeter Insulation:

1. Secure rigid insulation on perimeter foundation wall with adhesive, using “spot or ribbon method”, in accordance with the insulation manufacturer’s recommendations.

2. Place insulation horizontally and install continuously.

3. Stagger vertical joints of insulation, except free ends over line of control joints.

4. Extend insulation down below finish grade 48” or to top of footing, whichever is less, unless noted or indicated otherwise.

5. Do not allow insulation to be displaced during backfilling operation.

6. Immediately following application of insulation boards, place protective board covering over exposed insulation surfaces and adhesive secure boards in accordance with manufacturer's instructions. Install boards horizontally or vertically from base of insulation to top of insulation. Butt board joints tight, stagger from insulation joints.

E. Installation - Under Slab on Grade:

1. Place rigid insulation under slabs on grade after base for slab on grade has been compacted.

2. Extend insulation in 24” from the outside edge of slab unless noted or indicated otherwise.

3. Prevent insulation from being displaced or damaged while placing vapor barrier and pouring slabs.

F. Installation of Batt / Blanket Insulation:

1. Install unfaced batt/blanket insulation in accordance with manufacturers instructions, friction fitted between framing members in walls, ceilings and floors.

2. Install faced batt/blanket insulation in accordance with manufacturers instructions, with facing having formed flanges at the edges for either face or inset stapling at maximum 6” o.c. or taping to framing members. Install factory applied vapor-retarding membrane facing warm side of building spaces.

3. Install insulation without gaps or voids, lapping ends and side flanges. Do not compress insulation.

4. Trim insulation neatly to fit tight in spaces and tight to exterior side of mechanical and electrical services within the plane of the insulation.

5. Tape seal butt ends, lapped flanges, and punctures, tears and cuts in membrane.

G. Installation of Miscellaneous Batt Insulation:

1. Coordinate with other Sections and install fibrous insulation around exterior doorframes, window frames, roof expansion joints, roof and wall penetrations, and other voids to maintain continuity of building thermal barrier.

2. Insulate all miscellaneous gaps or voids to maintain thermal continuity of building.

H. Installation of Roof Insulation:

1. Verify that surfaces and site conditions are ready to receive work.

2. Verify that deck is supported and secured.

3. Verify that deck is clean and smooth, free of depressions, irregularities, or projections, properly sloped to drains.

4. Verify that deck surfaces are dry and free of dirt and debris. (Verify flutes of metal deck are clean and dry).

5. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set and wood cant strips, wood nailing strips and reglets are in place.

6. Start of work means installer accepts existing substrate.

7. Protect building surfaces against damage from roofing work.

8. Verify that metal deck units are properly secured in place.

3.04 EXTERIOR WALL SHEATHING CONTINUOUS INSULATION INSTALLATION

A. Verify manufacturer recommended cure time for air and water barrier system before installing

continuous insulation board.

B. Install extruded polystyrene (XPS) insulation boards over the exterior gypsum sheathing and air & water resistive barrier layer in accordance with manufacturers' written recommendations.

C. Install XPS insulation board in maximum sizes to minimize joints.

D. Locate joints square to framing members. Center joints over framing. Provide additional framing as necessary.

E. Stagger joints a minimum of one stud space from adjacent joints.

F. Insulation board edges shall be butted together tightly and fit around openings and penetrations. Install square edges to fit square and tight.

G. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.

H. Apply single layer of insulation boards to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

I. Fasten XPS insulation to exterior face of steel stud wall framing and exterior sheathing using screw and air & water sealing washer and compatible adhesive per manufacturer's written instructions.

    1. Screw with Air & Water Sealing Washer:

        a. Install through XPS insulation into sheathing and stud with self-drilling screws using a standard drill with a variable clutch adjustment and appropriate adapter or auto-feed fastening system.
        b. Do not attach with impact driver.
        c. Drive fasteners so the washer is tight and flush with insulation surface but do not countersink.
        d. Fastener spacing shall be evenly distributed and the minimum necessary per job site conditions as required by Insulation & Fastener Manufacturers to hold the continuous insulation in place until cladding attachment system can be installed to permanently secure the insulation board in accordance with the cladding requirements.
        e. Two-inch diameter pronged fasteners can bridge between adjoining board edges.

    2. Compatible Adhesive:

        a. Apply compatible adhesive to sheathing & air barrier, per adhesive manufacturer, air barrier manufacturer, and insulation manufacturer recommendations.
        b. Install XPS insulation in adhesive while wet.
        c. Hold insulation securely in place until adhesion is satisfactory.
        d. Application rate and spacing shall be evenly distributed and minimum necessary per jobsite conditions as required by Insulation & Adhesive Manufacturers to hold the continuous insulation in place until cladding attachment system can be installed to permanently secure the insulation board in accordance with the cladding requirements.

J. Fastening requirements may be revised per job site conditions if insulation board is being installed at the same time as the cladding attachment system that will serve to secure insulation board to the substrate. Contractor must receive written confirmation from the Architect before altering fastener requirements.

K. Install exterior cladding as soon as possible, best within 60 days.

3.05 RIGID PERIMETER AND UNDER SLAB INSULATION INSTALLATION

A. Verify all membrane testing has been satisfactorily completed prior to beginning installation.

B. Verify vapor retarding membrane is installed correctly if required prior to installation of extruded polystyrene insulation.

C. Verify below grade gas retarding membrane is installed correctly if required prior to installation of extruded polystyrene insulation.

D. Install extruded polystyrene (XPS) insulation boards over the drainage aggregate and vapor retarding membrane in accordance with manufacturers' written recommendations.

E. Install XPS insulation board in maximum sizes to minimize joints.

F. Locate joints square to structure.

G. Install insulation with long edges of XPS in continuous straight lines with edge joints staggered.

H. Stagger joints in subsequent layers.

I. Insulation board edges shall be butted together tightly and fit around openings and penetrations. Install square edges to fit square and tight.

J. Install in one or more layers to meet thickness indicated to envelop entire area to be insulated.

K. Apply single layer of insulation boards to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

L. Install reinforced slab immediately after installation of insulation as described in Section 033000.

3.06 FIBERGLASS BLANKET INSULATION INSTALLATION

A. Comply with manufacturer's installation instructions and ASTM C1320. Do not use unfaced insulation in exposed applications where there is potential for skin contact and irritation. Kraft and standard foil facings will burn and must not be left exposed. The facing must be installed in substantial contact with the unexposed surface of the ceiling, wall or floor finish. Protect facing from any open flame or heat source.

B. Friction-fit blanket insulation in place, until the interior finish is applied. Install batts to fill entire stud cavity, with no gaps, voids, or areas of compression. If stud cavity is less than 8 feet in height, cut lengths to friction fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes, and other irregularities.

    1. Do not install insulation on top of or within 3 inches of recessed light fixtures unless the fixtures are approved for such use.

C. In crawl spaces and where the underside of floors are exposed to unconditioned space, insulation shall fill the cavity or be installed in contact with the underside of the decking. If vapor retarder is required by local code, a Kraft vapor retarder must be in contact with a 15-minute thermal barrier, typically on the bottom side of the insulation.

D. Within exterior wall framing, install insulation between pipes and backside of sheathing. Cut or split insulation material as required to fit around wiring and plumbing.

E. Where showers and bathtubs are located on exterior walls, typically install insulation and vapor

retarder between units and exterior.

F. If eave ventilation baffles are required, install ventilation baffles at eaves to hold insulation down from roof sheathing and provide positive ventilation from eave to attic space.

G. Fluff insulation to full thickness for specified R-value before installation. Do not compress insulation in the cavity during installation, creating gaps or voids that could diminish thermal value.

H. Trim insulation neatly to fit spaces. Fill miscellaneous gaps and voids with insulation.

I. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

J. For unfaced batt insulation, install with friction fit or retain in place with manufacturer's recommended fasteners or mesh.

K. For batt insulation with factory-applied facing, install with vapor retarder membrane facing warm in the winter side of building spaces or as specified by local building code. Lap ends and side flanges of membrane over or between framing members. Tape to seal tears, cuts or misalignments in membrane.

L. Secure insulation in place using one of the following methods: Friction fit; staple or nail facing flanges in place as needed, tape in place, retain in place with spindle fasteners, retain in place with wire mesh secured to framing members.

3.07 ROOF INSULATION BOARD INSTALLATION

A. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch with like material.

E. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

F. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.

G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

H. Refer to Division 07 Roofing specifications for additional installation requirements.

3.07 CLEAN-UP

A. Do not permit insulation debris to accumulate in building or on job site.

B. Upon completion of work, leave premises clean, free from scraps and debris.

3.08 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. If black tape or coatings are installed over the XPS insulation board, cover the black surfaces as soon as possible to avoid damage due to potential solar heat build-up on the black surface.

C. Do not permit extruded polystyrene insulation board to come in contact with surfaces or temperatures in excess of 165°F.

D. Touch-up, repair, or replace damaged products.

3.09 VERIFICATION

A. Upon completion of the installation in each area, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072113 – ULTRA WALL INSULATION AND AIR BARRIER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of Ultra Wall System and air barrier system for installation in all cavity wall construction, as indicated on the drawings and specified herein. This Section includes the following:

1. Materials and installation methods for cavity wall insulation and air barrier system located in the non-accessible part of the wall.

2. Materials and installation to bridge and seal the following air leakage pathways and gaps:

   a. Connections of the walls to the roof air barrier.
   b. Connections of the walls to the foundations.
   c. Seismic and expansion joints.
   d. Openings and penetrations of window frames, store front, curtain wall.
   e. Barrier precast concrete and other envelope systems.
   f. Door frames.
   g. Piping, conduit, duct and similar penetrations
   h. Masonry ties, screws, bolts and similar penetrations.
   i. All other air leakage pathways in the building envelope.

3. Materials to act as flashings and counter-flashings.

B. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

C. Related Sections include the following:

1. Section 033000 – Cast-In-Place Concrete
2. Section 042000 – Unit Masonry
3. Section 054000 – Cold Formed Metal Framing
4. Section 061000 – Rough Carpentry
5. Section 061643 – Gypsum Sheathing
6. Section 072100 – Building Insulation
7. Section 072713 – Self-Adhered Non-Permeable Air Barrier Membrane
8. Section 076000 – Flashing and Sheet Metal
9. Section 079200 – Joint Sealants
10. Various Division 07 Roofing Specifications - requirement for coordination sequencing of membrane roofing; requirement to seal roof membrane to wall air barrier.
11. Section 085113 – Aluminum Windows – for window units at the periphery of the building.
12. Section 084113 – Aluminum Entrances and Storefronts
13. Section 084413 – Glazed Aluminum Curtainwalls

D. Products Installed, but not Supplied under This Section:

1. Self-Adhering Flexible flashings to be built into exterior wall systems are furnished under Section 072713.

1.02 REFERENCE STANDARDS

A. ASTM C272 – Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2018.
B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
F. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.
G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.03 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section and as listed in Section 014219.

B. Performance Requirements: Provide air/vapor barrier system constructed to perform as a continuous air/vapor barrier system, as building thermal insulation, and as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. System shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.

1. Provide a tested system in accordance with the Air Barrier Association of America's (ABAA's) testing protocol, provide air barrier materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.004 cfm/ft^2 @ 1.57 psf), when tested in accordance with ASTM E2178 (unmodified).

2. The water vapor permeance shall be determined in accordance with ASTM E 96 and shall be declared by the material manufacturer.

3. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:

    a. Foundation and walls, including penetrations, ties and anchors.
    b. Walls, windows, curtain walls, storefronts, louvers and doors.
    c. Different assemblies, and fixed openings within those assemblies.
    d. Wall and roof connections.
    e. Floors over unconditioned space.
    f. Walls, floor and roof across construction, control and expansion joints.
    g. Walls, floors and roof to utility, pipe and duct penetrations.
    h. Seismic and expansion joints.
    i. All other potential air leakage pathways in the building envelope.

C. Installer Qualifications:

1. Submit evidence of current Contractor accreditation and Installer certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit accreditation number of the Contractor and certification number(s) of the ABAA Certified Installer(s).

2. Each worker who is installing air barriers must be either a Certified Applicator or an installer who is registered with ABAA.

3. Each lead Certified Applicator can supervise a maximum of five registered installers. The Certified Applicator shall be thoroughly trained and experienced in the installation of air barriers

of the types being applied. Lead Certified Applicators shall perform or directly supervise all air/vapor barrier work on the project.

4. Air Barrier Installers shall be certified by BPQI (Building Performance Quality Institute) for the ABAA Quality Assurance Program in accordance with the requirements outlined in the QAP program used by ABAA. Installers shall have their photo-identification air barrier certification cards in their possession and available on the project site, for inspection upon request.

D. Single-Source Responsibility: Obtain primary ABAA listed materials from a single ABAA Evaluated Manufacturer regularly engaged in manufacturing specified rigid cellular thermal insulation board. Obtain secondary materials from a source acceptable to the primary materials Manufacturer.

E. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

F. Thermal Insulation: Not produced with, or contain, any of U.S. EPA regulated chlorofluorocarbon (CFC) compounds listed in Montreal Protocol of United Nations Environmental Program.

G. Surface Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

H. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

I. Field-Constructed Mock-Ups: Prior to installation of air/vapor barrier, apply air/vapor barrier as follows to verify details under shop drawing submittals and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution:

1. Apply air/vapor barrier in field-constructed mock-ups of assemblies specified in Section, “Unit Masonry”.

2. Construct typical exterior wall panel, 8 feet long by 8 feet wide, incorporating back-up wall, partial cladding, window and doorframe and sill, insulation, flashing, building corner condition, junction with roof system, foundation wall and typical penetrations and gaps; illustrating materials interface and seals. All transition membranes and seals shall be installed per the manufacturer’s system requirements.

3. Test mock-up for air and water infiltration in accordance with ASTM E 783 and ASTM E1105.

J. Implement the site Quality Assurance Program requirements used by ABAA. Cooperate with ABAA Auditor and independent testing and inspection agencies engaged by the Owner. Do not cover the air barrier assembly until it has been inspected, tested and accepted.

1.04 SUBMISSIONS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

1. At bid submission, provide evidence to the Architect of current Contractor accreditation and Installer certification under the Air Barrier Association of America’s (ABAA) Quality Assurance Program. Submit accreditation number of the Contractor and certification number(s) of the ABAA Certified Installer(s).

2. Submit shop drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.

3. Product Data: Submit manufacturer's product data sheets for each type of material, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.

    a. Submit manufacturer's specifications and installation instructions and recommended procedures for application.
    b. Submit letter from primary materials Manufacturer indicating approval of products not manufactured by primary manufacturer.
    c. Include statement that materials are compatible with adjacent materials proposed for use.
    d. Submit letter from Manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from Manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.

4. Air Barrier Assembly Testing: Verify air barrier assembly testing by the material manufacturer by visiting the ABAA website to ensure an ASTM E2357 test has been completed and to obtain results. Visit the ABAA website for the reported air barrier assembly leakage rate and illustrations or CAD details which includes the methods in which the assembly test mock-ups shall be assembled.

5. Certification by air/vapor barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

6. Certification of compatibility by air/vapor barrier manufacturer, listing all materials on the project that it connects to or that come in contact with it.

7. Submit three samples, 3 by 4 inch minimum size, of each air/vapor barrier material required for Project.

B. LEED Submittals: (Required for LEED Projects only)

1. Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 – LEED Requirements.

2. Credit EQ 4.1: Manufacturers' product data for interior field-applied adhesive and sealant products included in this section, including printed statement of VOC content in accordance with Section 013563 – LEED Requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, expiration date, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air/vapor barrier manufacturer. Protect stored materials from direct sunlight.

C. Protection: Use all means necessary to protect the materials of this section before, during, and

after installation and to protect the work and materials of other trades. Protect thermal insulation materials from physical damage and from deterioration due to moisture, soiling and other sources; store in dry interior location.

1. Do not expose to direct sunlight. Exposure limit 90 days.
2. Protect against ignition at all times.
3. Quickly complete installation and concealment of foam plastic board installation in each area of construction.

D. Comply with manufacturer's written recommendations for handling, storage, and protection during installation.

E. Avoid spillage. Immediately notify Owner if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

1.06 WASTE MANAGEMENT AND DISPOSAL

A. Separate and recycle waste materials in accordance with Section 017419 – Construction Waste Management. (For LEED Projects only)

B. Place materials defined as hazardous or toxic waste in designated containers.

C. Ensure emptied containers are sealed and stored safely for disposal away from children.

1.07 PROJECT CONDITIONS

A. Environmental Conditions: Apply air/vapor barrier within range of ambient and substrate temperatures recommended by air/vapor barrier manufacturer. Do not apply air/vapor barrier to a damp or wet substrate, unless the manufacturer specifically permits that for the product.

B. Do not apply air/vapor barrier in snow, rain, fog, or mist.

C. Do not apply air/vapor barrier components when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

D. Compatibility. Do not allow rigid cellular thermal insulation board to come in contact with chemically incompatible materials.

E. Ultra-violet exposure. Do not expose rigid cellular thermal insulation board air barrier to sunlight longer than as recommended by the Manufacturer of the material.

F. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building.

1.08 WARRANTY

A. For sealant and membrane materials, the 12-month warranty period shall be extended to 24 months.

B. Material Warranty: Provide the manufacturer’s three (3) year air/vapor barrier material warranty under the provisions of the General and Supplementary Conditions, and Section 017000, Contract Closeout.

C. System Warranty: Provide the manufacturer’s three year system warranty, including the primary air/vapor barrier and installed accessory sealant and membrane materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Air Barrier: Tested in accordance with ASTM E2357 at pressure of 6.24 psf (300 Pa) or greater, with air infiltration less than 0.04 cfm/sq ft (0.2 L/sq m) of fixed wall area.

1. Conduct testing at positive and negative sustained wind loading of 12.5 psf (0.6 kPa) for one-hour duration in each direction.

2. Provide pressure cycling of wall at 2000 cycles in both positive and negative directions, ending with wind gust loading at 25 psf (1.2 kPa).

B. Water Penetration: Tested in accordance with ASTM E331, with minimum pressure differential of 6.24 psf (300 Pa) for at least two hour test duration without any uncontrolled water penetration.

1. All joints, penetrations, and gaps of the thermal (and air) layer wall system shall be made water and air tight.

2.02 DUPONT™ CAVITYMATE™ ULTRA WALL INSULATION SYSTEM

A. General: Design is based on insulating materials as specified on drawings. The terminology used may include reference to specific manufacturers' proprietary products. Such reference shall be construed only as establishing the quality of the materials and workmanship to be used under this section and shall not, in any way, be construed as limiting competition.

B. Products used shall be those upon which design is based or shall be equal products approved in advance by the Architect.

C. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578, Type IV with patented carbon-black technology wall insulation system placed between wall anchors of masonry veneer cavity walls and with seam treatment to form a continuous thermal, air, and water barrier system.

1. Basis of Design:

a. DuPont de Nemours Inc.; DuPont™ Styrofoam™ Brand Cavitymate™ Extruded Polystyrene Insulation: building.dupont.com/commercial; with carbon black materials in the foam and square edges. Boards installed horizontally, typically 15-3/4 inch by 96-inch orientation.

2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.

3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

4. Compressive Resistance: At least 25 psi (173 kPa).

5. Density: At least 1.45 lbs/cu ft (23 kg/cu m).

6. Water Vapor Permeance: Maximum of 1.5 perms (86 ng/Pa sec sq m) per 1 inch (25.4 mm) thickness.

7. Board Overall Dimensions: 15-3/4 inch (400 mm) wide by 96 inch (2.44 m) long.

8. Board Thickness: Nominal thickness of 2.125" or as shown on drawings, with square edge treatment along edges.

9. Thermal Resistance (R-value): R-5.6/in at 75 degrees F.

10. Water Absorption: ASTM C272, 0.1% max, by volume.

2.03 ACCESSORIES

A. Gypsum Sheathing: Provide moisture and mold-resistant glass mat gypsum wall board in accordance with Section 061643.

B. Board Insulation Bonding Adhesive: Provide product as recommended by insulation manufacturer that will not damage insulation or substrates.

1. Products: Great Stuff Pro™ Gaps and Cracks single component polyurethane low-pressure sealant single component polyurethane low-pressure foam sealant as manufactured by DuPont de Nemours Inc.

C. Foam Sealant Penetration Filler: Provide single component spray polyurethane foam (SPF) for sealing wall penetrations through board insulation.

1. Products: DuPont™ Great Stuff Pro™ Gaps and Cracks* single component polyurethane low-pressure sealant or DuPont™ Great Stuff Pro™ Window and Door* single component polyurethane low-pressure foam sealant as manufactured by DuPont de Nemours Inc.

D. Face Repair Flashing: Provide board insulation manufacturer's recommended flashing for repair of damaged board insulation facer.

1. Products:

a. DuPont™ LiquidArmor™ CM* Spray Flashing and Sealant as manufactured by DuPont de Nemours Inc.
b. DuPont™ LiquidArmor™ LT* Flexible Single Component Silicone Flashing as manufactured by DuPont de Nemours Inc.
c. DuPont™ LiquidArmor™ QS Spray Flashing and Sealant* as manufactured by DuPont de Nemours Inc.

E. Flashing and Sealant: Provide for sealing joints, seams and veneer tie penetrations through board insulation.

1. One component polyurethane foam.

a. Product: DuPont™ Great Stuff Pro™ Gaps & Cracks polyurethane foam sealant* as manufactured by DuPont de Nemours Inc. for gaps >= 1/4" wide.

2. Spray applied elastomeric liquid flashing and sealant, grey-blue color.

a. Product: DuPont™ LiquidArmor™ CM Flashing and Sealant* (for gaps < 1/4”) as manufactured by DuPont de Nemours Inc.
b. Product: DuPont™ LiquidArmor™ QS Spray Flashing and Sealant* (for gaps < 1/4”) as manufactured by DuPont de Nemours Inc.

3. Trowel applied single component silicone flashing and sealant, grey color.

a. Product: DuPont™ LiquidArmor™ LT Flashing and Sealant* (for gaps <1/4”) as manufactured by DuPont de Nemours Inc.

F. Roof/Wall Juncture Sealing

1. Maintain continuity of air barrier by sealing the roof/wall juncture.

2. Acceptable Products:

    a. DuPont de Nemours Inc.; FROTH-PAK Foam Insulation (Class A).

G. Self-Adhering Transition Flashing: Provide for through-wall flashing, roof-to-wall transitions, parapet transitions, above window kick-outs, wall to below-grade transitions, wall offsets, rough window openings, balcony transitions.

1. Product: DuPont™ DuraGard™ CM Transition Flashing as manufactured by DuPont de Nemours Inc.

2.04 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be as selected by the Contractor, subject to the approval of the Architect.

B. Provide sealants in accordance with Section 079200 - Joint Sealants. Comply with ASTM C920 and ASTM C920 classifications for type, grade, class, and uses.

1. Silicone Sealant (Type A): Natural cure, low modulus, to seal sheet membrane flashing to polyethylene face of sheet rubberized-asphalt barrier and to seal between and to non-bituminous sheet systems.

    a. Acceptable materials: DOWSIL 790™; Pecora 864 NST

2. Substrate Cleaner: Non-corrosive type recommended by sealant manufacturer and compatible with adjacent materials.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Carefully examine all the areas and conditions under which work of this section will be installed, with installer present, for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing work of this section; correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

B. Insure that work of all preceding trades is completed prior to starting work of this Section.

C. Do not proceed with installation until after minimum concrete curing period recommended by air/vapor barrier manufacturer.

D. Ensure that:

1. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants;

2. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions;

3. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

E. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

F. Notify the Architect in writing of anticipated problems using air/vapor barrier over substrate.

3.02 INSTALLATION, CAVITYMATE™ ULTRA WALL INSULATION SYSTEM

A. Installation Instructions for Air Barrier – Rigid Cellular Thermal Insulation Board: Install insulation boards air barrier in a way that provides continuity throughout the building envelope. Install materials in accordance with manufacturer's recommendations and installation instructions along with the following:

1. Apply 2 inch diameter daubs of adhesive at four corners of interior face of board insulation and one at the center, for total of five.

2. Place board insulation between wall ties and other obstructions with staggered joints and provide 1/4 inch to 1/2 inch wide gap at end joints.

    a. Press board insulation units firmly against wall sheathing of cavity wall construction, and ensure insulation is continuous.
    b. Make insulation continuous.

3. Fill open spaces between board insulation with single component foam sealant to ensure continuous air and water vapor barrier.

4. Install board insulation to cover entire insulated area, cut and fit insulation tightly around obstructions, and properly remove projections that interfere with insulation placement.

5. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

6. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

7. Install the insulation boards air barrier with the printed side out.

8. If the insulation boards have shiplap edges, install with the top shiplap edge up and against the substrate face.

9. Install boards with the eight or twelve foot length horizontally. Use maximum board lengths to minimize number of joints.

10. Abut insulation boards tightly around openings and penetrations.

11. Seal all edge and end joints and through wall penetrations such as doors and windows with self-adhering flashing, approved sealant foam or sealant tape.

12. Install self-adhered flashing or sealant tape in a shingle fashion over all joints. Overlap the joints in the tape by the width of the tape (i.e. 4 inch tape is overlapped 4 inch.

13. Repair all damage to insulation boards air barrier. Install a section of new insulation boards the same size as cut out. Seal any gaps with sealant foam. Install self-adhered flashing or sealant tape in a shingle fashion over all joints. For small holes, fill the small hole first with sealant foam then cover with self adhered flashing, or sealant tape in a shingle fashion over all joints.

3.03 INSTALLATION, GENERAL

A. Roof/Wall Juncture:

1. Maintain continuity of air barrier by sealing the roof/wall juncture with Roof/Wall Juncture Sealing material.

B. Flashing and Sealant:

1. Apply material within application limits of product manufacturer.

2. Do not apply product on surfaces with standing water or frost.

3. Avoid installing on days with a high probability of significant rainfall.

4. Seal gaps greater than 1/4 inch in width with penetration filler prior to applying flashing and sealant.

    a. If facer on board insulation is damaged, make note of affected area and apply additional spray over damaged area.
    b. Replace damaged insulation, or repair facer flaws with appropriate flashing as recommended by insulation panel manufacturer.

5. Apply flashing and sealant to board joints, penetrations and other fenestration openings as required at material required application thickness.

    a. Apply flashing 3 inches, plus or minus 1 inch wide over board insulation joints, with at least 1 inch of spray covers each side of joint.
    b. Apply flashing over fasteners and washers along board insulation joints.
    c. Install façade attachment system after flashing has been applied.

6. Rough Openings: Apply flashing and sealant at least 3 inches onto face of insulation panel sheathing, and completely cover edge of insulation board; also spray at least 3 inch back onto rough opening substrate.

    a. It is recommended to cover back onto rough opening at least 1 inch past the interior weatherseal.

7. Board Insulation or Substrate Penetrations: Apply flashing and sealant at least 2 inches onto face of insulation sheathing and at least 2 inches onto penetration or primary flashing substrate.

8. Use wet mil thickness gauge to ensure proper installation thickness.

    a. Where consistently below minimum thickness, apply another layer to achieve proper thickness requirements.

9. Visually inspect for any areas missed and trowel on sealant as necessary.

3.04 FIELD QUALITY CONTROL

A. Site Tests:

1. The Licensed Installer shall complete the Daily Work Record and record all information required including the results of the testing. The Daily Work Record shall be kept on site for routine inspection. Copies of the Daily Work Record shall be forwarded to the Owner or Owner's representative upon request. Copies of the Daily Work Record or monthly summaries shall

be sent to the Owner's Representative on a monthly basis as required by the Quality Assurance Program.

2. Transition membranes shall be pull tested in accordance with the in-place Quality Assurance Program requirements.

3. The costs incurred for daily testing and inspection by the Licensed Installer and the completion of the Daily Work Record shall be borne by the Licensed Contractor.

3.05 INSPECTION

A. Arrange for site inspections by the Owner's Representative. The cost of inspections shall be included in the bid provided by the Prime Contractor.

B. The site-inspections shall verify conformance with the manufacturers instructions, the standard ULC S705.2-02 Installation standard, the Quality Assurance Program, and this section of the project specification.

C. Inspections and testing shall be carried out at 5%, 50% and 95% of completion. A written inspection report shall be forwarded to the architect and the licensed installer within 3 working days of the inspection and test being performed. In the case of any deficiencies, the licensed inspector may verbally advise the licensed installer at the time of the inspection.

D. If the inspection reveals any defects, the Licensed Contractor shall immediately rectify all such defects at his cost.

3.06 PROTECTION & CLEAN-UP

A. Do not permit insulation debris to accumulate in building or on job site.

B. Upon completion of work, leave premises clean, free from scraps and debris.

C. Protect air barrier materials from damage during installation and the remainder of the construction period, according to manufacturer's written instructions.

D. Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the air barrier manufacturer.

E. Protect board insulation from excess moisture, mechanical damage, and exposure to open flame.

F. Repair damage caused to board insulation in a manner that retains integrity and continuity of insulation and facer materials.

G. Keep board insulation dry and above water on jobsite, and cover with tarp until ready for installation.

H. Promptly cover board insulation with cladding.

3.07 VERIFICATION

A. Upon completion of the installation in each area, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072114 – MINERAL BOARD INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of fireproofing insulation and smoke-stop materials at voids around penetrations through fire-rated and smoke barrier wall and roof construction assemblies, and as indicated on the drawings and specified herein

B. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

C. Related Sections include the following:

1. Section 042000 – Unit Masonry
2. Section 051200 – Structural Steel Framing
3. Section 052100 – Steel Joist Framing
4. Section 053000 – Metal Decking
5. Section 072100 – Building Insulation

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section and as listed in Section 014219.

B. Reference Standards:

1. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. ASTM C518 - Steady-State Thermal Transmission Properties by Means of The Heat Flow Meter.
3. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E119: Standard Test Methods for Fire Tests of Building Constructions and Materials.

1.03 SUBMISSIONS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

B. Product Data: Submit manufacturer's specifications and installation instructions for each type of insulation.

C. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values, densities, compression strengths, fire performance, perm ratings, water absorption ratings, and similar properties.

D. Samples for Verification:

1. Submit, to the job site, 6” x 6” samples of each type and thickness of fireproofing insulation.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered in their original, unopened packages or containers with all labels intact

and legible. Protect all materials from physical damage and from deterioration by moisture, soiling, and other sources.

B. Store all materials in a single location protected from weather, moisture, and open flame or sparks.

C. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

D. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

PART 2 - PRODUCTS

2.01 FIREPROOFING INSULATION MATERIALS

A. Basis-of-Design: Thermafiber® SAFB™ (Sound Attenuation Fire Blanket) by Thermafiber, Inc. (an Owens Corning company), One Owens Corning Parkway, Toledo, OH 43659. Toll free 888-834-2371, Fax 260-563-8979, or www.owenscorning.com.

B. Materials:

1. Mineral Wool Batts: Formaldehyde-free option, non-combustible, moisture-resistant, non-corrosive, non-deteriorating, mildew-resistant, and vermin-resistant mineral.

2. Standards and Codes Compliance:

   a. NFPA 101: Class A rated interior finish.
   b. ASTM C 665: Type I, non-corrosive.
   c. ASTM E 136: Non-combustible.
   d. CAN/ULC S114: Complies.
   e. ASTM C 1104: Absorbs less than 1% by volume.
   f. ASTM E 84/CAN/ULC S102: Flame Spread 0, Smoke Developed 0.

3. Properties:

   a. Density: 4.0 pcf for 1-inch thickness, 2.5 pcf for thicknesses 1-1/2 inches to 7 inches.
   b. Manufacturing Tolerance: Plus 1/4 inch, minus 1/8 inch for thickness, plus or minus 1/8 inch for widths, plus or minus 1/2 inch for lengths.

4. Fiber Type: Standard fiber 70% pre-consumer recycled content.

5. Fiber Type: EPA Choice fiber; minimum 75% pre-consumer recycled content; complies with EPA Preference Program.

2.02 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be as selected by the Contractor, subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

A. Carefully examine all the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Except as otherwise specifically directed by the Architect, install all building insulation in the size and thickness specified, in strict accordance with the manufacturer's instructions.

B. Install insulation in accordance with approved submittals, manufacturer's written recommendations, and guidelines.

1. Interior Stud Cavity: Friction-fit SAFB securely between studs. Butt ends of blankets closely together and fill all voids.

2. Creased SAFB: Using SAFB 1 inch wider than regular blankets, bow the blankets slightly to fit into stud cavity. Slit the blankets vertically 1inch deep with a utility knife down the center.

3. Floor-Ceiling: Friction-fit SAFB securely between floor joints.

4. Ceiling Overlayment: Lay SAFB over ceiling panels extending 48 inches beyond all partitions. Tightly fit around all hangers, obstructions, and penetrations.

C. Do not over-compress insulation to fit into spaces.

D. Fit insulation closely around electrical boxes, pipes, ducts, frames, and other objects in or passing through insulation.

E. Install products in proper relationship with each other and adjacent construction.

F. Repair damage to adjacent materials caused by insulation installation.

3.03 CLEAN-UP

A. Do not permit insulation debris to accumulate in building or on job site.

B. Upon completion of work, leave premises clean, free from scraps and debris.

3.04 PROTECTION

A. Protect installed products from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. Protect installed products and accessories from damage during construction.

3.05 VERIFICATION

A. Upon completion of the installation in each area, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072600 – VAPOR RETARDERS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Work specified in this section covers furnishing, delivery, and installation of a vapor barrier under all new interior slabs on grade (horizontal application).

B. Products supplied under this section:

1. Vapor Barrier and installation accessories for installation under concrete slabs.

C. Related Sections:

1. Section 033000 – Cast-in-Place Concrete.
2. Section 072100 – Building Insulation

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
3. ASTM E1993-98 - Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
4. ASTM F1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
5. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

B. American Concrete Institute (ACI)

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.03 SUBMITTALS

A. Quality Control/Assurance

1. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

2. Summary of test results per paragraph 9.3 of ASTM E1745.

3. Manufacturer’s samples and literature

4. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

5. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

1.04 QUALITY ASSURANCE

A. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

B. Vapor barrier manufacturer must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

C. Manufacturer verify in writing 20 years in the industry with no reported product failures.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Stack membrane on smooth ground or wood platform to eliminate warping.

D. Protect materials during handling and application to prevent damage or contamination.

1.06 ENVIRONMENTAL REQUIREMENTS

D. Product not intended for uses subject to abuse or permanent exposure to the elements.

E. Do not apply on frozen ground.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Typical Interior Slabs Vapor Barrier: Under typical interior concrete slabs where finished flooring does not involve wood, provide non-woven, polyester, reinforced, polyethylene coated sheet of 15 mil thickness.

1. Vapor Barrier Products:

   a. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
   b. Or Architect approved equal.

2. Vapor Barrier membrane must have the following properties:

   a. Maintain permeance of less than 0.01 Perms [grains/(ft2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
   b. Other performance criteria:

      1) Strength: ASTM E1745 Class A.
      2) Thickness: 15 mils minimum.

   c. Provide third party documentation that all testing was performed on a single production roll

per ASTM E1745 Section 8.1.

d. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

B. Under Wood Floors Interior Slabs Vapor Barrier: Vapor Barrier under interior concrete slabs where finished flooring involves wood assemblies such as gymnasiums and stages provide Bituminous Vaporproofing/Waterproofing Membrane:

1. Vapor Barrier Products:

a. Basis of Design: Premoulded Membrane® Vapor Seal with Plasmatic Core by W.R Meadows. W.R. Meadows, Inc., PO Box 338, Hampshire Illinois 60140-0338. (800) 342-5976. (847) 683-4500.Fax (847) 683-4544. website www.wremeadows.com.

b. Or Architect approved equal.

2. Vapor Barrier must be seven-ply, weather-coated, permanently bonded, semi-flexible bituminous core board composed of a 3-ply plasmatic matrix sealed between liners of asphalt-impregnated felt and a glass mat liner. Vapor Barrier shall consist of an asphalt weather coat and covered with a polyethylene anti-stick sheet. Vapor Barrier shall meet or exceed all requirements of ASTM E 1993-98 and shall have the following characteristics:

a. Minimum Permeance ASTM F1249, calibrated to ASTM E96, Water Method: 0.0011 Perms.

b. Tensile Strength ASTM E154, Section 9: 156 LBS. Force/Inch.

c. Puncture Resistance ASTM E154: 149 LBS. Force.

2.02 ACCESSORIES

A. Typical Interior Slabs Vapor Barrier Accessories: by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com

1. Seams:

a. Stego Tape

2. Sealing Penetrations of Vapor barrier:

a. Stego Mastic

b. Stego Tape

3. Perimeter/edge seal:

a. Stego Crete Claw

b. Stego Term Bar

c. StegoTack Tape (double-sided sealant tape)

d. One-sided seaming tape is not a recommended method of sealing at the terminated edge.

4. Penetration Prevention:

a. Beast Foot

b. Beast Form Stake

5. Vapor Barrier-Safe Screed System:

a. Beast Screed

b. Beast Hook

B. Under Wood Floors Interior Slabs Vapor Barrier Accessories:

1. Bonding Asphalt: Catalytic Bonding Asphalt or Hydralastic 836.

2. Adhesive: Pointing Mastic.

3. Joint Tape: PMPC Tape.

4. Pointing Mastic: Pointing Mastic.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.

1. Level and tamp or roll aggregate, sand or tamped earth base.

B. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

C. Prepare surfaces in accordance with manufacturers instructions.

D. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.02 INSTALLATION

A. Installation of Typical Interior Slabs Vapor Barrier:

1. Install vapor barrier in accordance ASTM E1643.

a. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.

b. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

c. The perimeter seal can be handled several ways. When sealing to the slab use Crete Claw. When sealing to a wall use StegoTack Tape or both StegoTack Tape and Stego Term Bar as required.

1) Sealing to Slab: Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
2) Sealing to Wall: Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer’s instructions. Ensure the concrete is clean and dry prior to adhering tape.

d. Overlap joints 6 inches and seal with manufacturer’s seam tape.

e. Apply seam tape/Crete Claw to a clean and dry vapor barrier.

f. Seal all penetrations (including pipes) per manufacturer's instructions.

g. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.

h. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.

i. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.

j. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

k. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

B. Installation of Bituminous Vaporproofing/Waterproofing Membrane

1. Apply membrane in accordance with manufacturer's instructions to provide a permanent, monolithic vapor seal without voids or open seams.

2. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

3. Place membrane in position by either Dutch lap method with laps sealed with bonding asphalt or by butt joint method with joints sealed with joint tape.

4. Point exposed edges with pointing mastic to prevent water from traveling under membrane.

5. Place membrane collar around protrusions through concrete slab, including sewer pipes, water pipes, and utility inlets to create a positive seal between protrusions and membrane. Seal in place with joint tape and point around protrusions with pointing mastic.

6. Adhere membrane to vertical surfaces with adhesive.

3.03 PROTECTION

A. Protect all vapor barriers from damage before and during placement of reinforcing and concrete. Check for and repair any puncture before start of concrete placement.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 075323 – EPDM ROOFING SYSTEM FULLY ADHERED

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of Work:

1. Provide and install modified E.P.D.M. system where shown on the drawings and specified herein. Work shall include, but not be limited to the following:

    a. Furnish and install EPDM roofing system with flashings and all other incidental and accessory items to comprise a complete roofing system.
    b. Removal and disposal of existing roofing and insulation to the depths as shown on the Contract Drawings or as required for the new installations.
    c. Installation of New vapor barrier to the existing deck.
    d. Installation of New tapered roof insulation as indicated on drawings.
    e. New single-ply, thermoset roof system, 60 mil reinforced EPDM sheet system, fully adhered membrane.
    f. New wall and base flashing, expansion joints.
    g. Cleaners, adhesives, sealants, seaming tapes, tape primers and fasteners.
    h. Flashing of all new roof penetrations.
    i. New primary roofing manufacturer’s gravel stops, wall copings and/or counter flashing and termination bars.
    j. Miscellaneous sheet metal or metal flashing.
    k. Provision and installation of new drains, connecting piping, and insulation where indicated.
    l. Manufacturer's Guarantee.
    m. New wood blocking and anchor bolts around roof perimeter, roof penetrations, and similar locations, as required for the complete installation of the roofing system, and to meet new perimeter edge heights.
    n. Installation of new equipment curbs where indicated.
    o. Walkways where indicated.
    p. Provision of new tapered cants as required to meet new blocking at perimeter edges.
    q. Raising roof hatches as required to 8" above finish roof, as a result of the work required to raise finished roof surfaces.
    r. Raising skylights as required to 8" above finish roof, as a result of the work required to raise finished roof surfaces.
    s. Plumbing, mechanical or electrical modifications as required for completion of the installation.
    t. Re-securement of roof decking as required by the contract documents.

B. Related Work/Requirements Specified Elsewhere:

1. Section 012100 – Allowances – Where indicated.
2. Section 061000 – Rough Carpentry – for wood nailers, cants, curbs and blocking.
3. Section 076000 – Flashing and Sheet Metal – for metal roof penetration flashings, flashings and counter flashings.
4. Section 079200 – Joint Sealants

1.02 GENERAL

A. The intention of this specification is to outline the entire roofing project, describing materials, methods, job conditions, etc., so that during the entire construction period, a complete watertight condition is maintained, and at completion, a new roofing system shall be installed.

B. The Instructions to Bidders, the General Conditions of the Contract for the Construction for Buildings prepared by the American Institute of Architects, the Supplementary General Conditions, and the General Requirements are part of this specification whether bound herewith or not, and the Contractor shall refer to them for instruction pertaining to his work.

1.03 ALTERNATES

A. Where so indicated the Contractor shall consult the "Bid Proposal Form" and read all alternates and assure himself whether or not they will add to, deduct from, or in any way affect the cost of the work under this section of the specifications. He shall include all such applicable alternates in his proposal.

1.04 REFERENCE STANDARDS

A. General: References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards are deemed mandatory and applicable to the Work.

B. Factory Mutual (FM) Engineering Corporation, Norwood, MA - Roof Assembly Classifications.
C. Building Code of New York State
D. FS HH-I-526 - Insulation Board, Thermal (Mineral Fiber).
E. FS HH-I-529 - Insulation Board, Thermal (Mineral Aggregate).
F. FS HH-I-530 - Insulation Board, Thermal (Urethane).
G. FS HH-I-551 - Insulation Block and Boards, Thermal (Cellular Glass).
H. FS LLL-I-535 - Insulation Board, Thermal (Cellulosic Fiber).
I. ASTM D 1079 - Standard Terminology Relating to Roofing and Waterproofing
J. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.
K. Underwriters Laboratories (UL), Northbrook, IL - Fire Hazard Classifications.
L. Sheet Metal and Air-Conditioning Contractors National Association, Inc., Chantilly, VA (SMACNA).
M. CGSB 37GP56M Classification: Type 2, Class C, Grade 1.
N. American Society for Testing and Materials (ASTM)
O. Occupational Safety and Health Administration (OSHA), Washington, DC
P. Polyisocyanurate Insulation Manufacturers Association (PIMA) – Bethesda, Maryland – Average Weighted R-Values of roof insulation products.
Q. ANSI/SPRI/FM 4435/ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.05 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Jobsite Safety: Execute all operations and provide a safe work environment in accordance to OSHA standards and regulations. This requirement applies to all contractor personnel, associated subcontractors, workers in other trades, and jobsite visitors.

1. Follow all industry fire prevention guidelines for storage of materials, staging areas, roof access, and application means and methods.

2. Any applicable local fire codes supersede industry guidelines.

D. Wind Loads: Provide a roof system, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of the 2020 New York State Building Code or the American Society of Building Engineers' ASCE7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever is more stringent. **Refer to drawings for Wind Design Data.**

E. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-105.

2. Hail Resistance: MH.

1.06 SYSTEM DESCRIPTION

A. For the purposes of this specification, the roofing system has been based upon products manufactured by:

1. Johns Manville Roofing Systems Group, Denver CO
2. Carlisle Syntec Systems, Carlisle PA
3. or as approved equal by the Architect.

B. System Description:

Vapor barrier, tapered insulation, cover board, and a single ply membrane system. Include all required pre-manufactured copings, gravel stops, and flashings and blocking as required, to provide complete roofing system warranty, whether detailed on the drawings or not.

1.07 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures, and as modified below. All submittals shall be submitted prior to the Pre-Installation Conference.

B. Manufacturer's Product Data sheets and installation instructions on all materials proposed for use. This shall include catalogue sheets, specifications, and installation instructions for each material specified. Submit an intent to warrant, executed by an authorized representative of system manufacturer, indicating that the manufacturer has reviewed drawings, specifications and conditions affecting the work and, and proposes to provide warranties as referenced herein without further stipulation.

C. Manufacturer's Warranty: Submit a sample copy of the membrane manufacturer's standard 20 year No Dollar Limit roofing warranty, covering workmanship and materials.

D. U.L., F.M. and S.P.R.I Compliance Data: Contact roofing manufacturer for information.

E. Shop drawings indicating setting plan for tapered insulation. (Field verify exact location of drains prior to submittal). Submit an accurate layout of the tapered insulation, designed and provided by the membrane manufacturer, showing all slopes to drains. Show cross section drawings illustrating the location and thickness of the tapered insulation pieces and filler pieces; show the thickness of the insulation system at high and low points.

1. Where there is a proposed deviation from the Contract Documents, submit the revised detail labeled as such for approval. On the revised detail, show existing conditions and referenced directly to the related details on the Contract Drawings.

2. Submit an accurate layout of the wood nailers showing their required locations, and required spacing between nailers. Show the direction of the felt run in relation to the slope of the deck and the wood nailers.

F. Samples: All submitted samples must be labeled and supplied by the manufacturer for each submittal package. Submit:

1. (2) Two 12-inch square samples of membrane illustrating the color and thickness to be used;

2. (2) Two 12-inch samples of each roofing membrane type to be used;

3. (2) Two 12-inch samples of all proposed tapered insulation to be used;

4. (2) Two 12-inch samples of all proposed cover-boards to be used;

5. (2) Two samples of each type of fastener proposed to be used.

G. Submit a copy of the manufacturer's installation instructions.

H. Specified roof drain.

I. Shop drawings indicating proposed configuration of perimeter blocking and fastening, if different than that as shown on the Contract Documents.

1. Complete configuration of existing roof indicating layout of membrane sheets, seams between sheets, and location and type of all roof penetrations.

2. Complete details for attaching membrane at perimeter of roof, flashing of roof penetrations, blocking configurations, and other special details as required. This shall include, but not be limited to pre-manufactured gravel stops and copings. Note: Field-fabricated gravel stops and copings will not be permitted.

3. Complete layout of all tapered insulation indicating compliance with drainage patterns as shown on the drawings.

J. Submit list of at least ten (10) successfully completed roofing projects using each of the EPDM roofing systems proposed for use in this project. Include name, address, and telephone number of Owner's representatives. Identify square footage of total installation for each project listed.

1. If the above list of completed projects was not installed by the applicator, submit an additional list of at least four completed EPDM roofing projects installed by the applicator. Include name, address, and telephone number of Owner's Representative.

K. Certifications:

1. **All potential bidders shall submit notarized certification letters from the roofing manufacturer's main corporate offices indicating that the bidder has a minimum of five (5) years previous experience in the specific roofing system applications specified herein, and will provide a list of acknowledged projects to verify same. The contractor must be approved by the roofing system manufacturer for the installation of the primary roofing materials indicated, including membrane and flashing.**

2. Submit certification that roofing systems installed as part of this project comply with the specifications and installation instructions of the roofing system manufacturer.

3. Submit letter from roofing system manufacturer indicating that insulation has been approved by the roofing system manufacturer for use with the roofing system.

4. Submit letter of certification from roofing manufacturer that the specified EPDM systems have been designed to satisfy the specified wind uplift criteria.

5. Submit letter of certification from the Contractor's NYS certified Structural Engineer that the proposed blocking and fastening systems have been designed to satisfy the specified wind uplift criteria necessary to carry the specified roofing system warranty.

1.08 QUALIFICATIONS

A. Applicator's Qualifications:

1. **Roofing applicator must be approved by the manufacturer prior to the bidding period and throughout the installation and able to present a copy of his certification as a part of the bid qualifications package required by this contract. This certification must be an original document as prepared directly by the manufacturer's corporate offices, specific for this contract. Submit certifications from manufacturer pursuant to 1.06Kb above.**

2. **Roofing applicator must have installed and successfully completed at least (10) ten roofs of the same materials and methods specified for this project, completed over the last five (5) years. Submit certifications from manufacturer pursuant to 1.07J above.** (List last ten such jobs within 50 miles of the job site, including address, type of system and number of plies, if applicable, square footage, date installed and owner/agent with whom contracted)

3. **The selected bidder must be a single firm specializing in the types of roofing required, providing undivided responsibility for the performance of all component parts of the roofing system.**

4. **The contractor must be approved by the roofing system manufacturer for the installation of the primary roofing materials indicated, including membrane and flashing, and his firm must be in continuous operation of installing such roofing systems for two years or more.**

5. **The contractor must have at least five (5) years of manufacturer-certified experience in installing commercial scale EPDM roofing systems as required by this specification.**

6. **The contractor must employ roofing application foremen who have successfully completed all training offered by roofing systems manufacturer, including schools, seminars, etc. Provide a letter certifying that the job foreman or crew chief and at least one other member of the roofing crew have installed at least similar systems and are thoroughly familiar with all aspects of the installation. Installation of a minimum of five roofs of comparable size, scope, and complexity as the Work of this Section of roofing**

system specified in the Contract Documents, for which this individual served as field foreman in direct, responsible charge of all roofing work crews. (List last five such jobs within 50 miles of the job site, including address, type of system and number of plies, if applicable, square footage, date installed and owner/agent with whom contracted).

7. **Should the successful contractor opt to utilize the services of a subcontractor for any installations under this contract, the subcontractor shall also meet all requirements of experience and qualifications listed herein required for the Prime Contractor.** Note: No more than 25% of the required installations shall be made by manufacturer-certified subcontractors to the Prime Contractor, in conformance with the Instructions to Bidders section of the Project Manual.

8. Contractor's Required Closeout Submittals: The Contractor shall submit a final invoice for the project, as well as close-out of any and all open change orders. He shall include all final waivers of liens from all material suppliers and subcontractors. (Refer to Section 01700 for additional information.) Provide a completed punch list certification by the Contractor and the Owner's Representative.

B. Manufacturer's Qualifications:

1. The roofing system manufacturer must have a minimum of 10 years experience in the manufacture of EPDM vulcanized thermal-set membranes.

2. **For the work of this contract, the roofing system manufacturer must provide a factory-trained and factory-authorized field representative/technician, employed by the roofing system manufacturer, to supervise this project via a minimum of 10 on site visits, and to review installation procedures and advise applicator on procedures and precautions in use of roofing materials required for final inspection of the roofing system. The cost of this manufacturer's representative, and costs incurred for the supply of same, shall be considered inclusive within the contractor's Base Bid for this project. No exceptions will be made for this requirement. Work shall not begin on this project until this representative has arrived to the project, inspected it, and authorized for work to start. The manufacturer's representative shall sign-in upon each visit with the Construction Manager or designated owners representative, so that accurate attendance records can be kept. The intent of the site visits is that the manufacturer's representative will ensure the quality of the preparation and application of the roof system. The representative will inspect the project on a periodic basis to anticipate problems before they occur, answer questions quickly and look out for the best interest of the Owner. The manufacturer's representative will issue a written inspection report for each visit to be issued to the Owners Representative, Architect & Contractor.**

3. The roofing system manufacturer must provide a NDL warranty (See paragraph 1.14 - "Warranty and Guarantee") upon **satisfactory** installation of the roofing system.

4. All roofing work, including terminations and other work covered under the roofing manufacturer's NDL Guarantee shall be performed by the Prime Contractor. No subcontractors will be permitted on this portion **of** the work.

1.09 REGULATORY REQUIREMENTS

A. Conform to applicable codes for roof assembly fire hazard requirements.

B. Factory Mutual Engineering and Research Corporation (FM):

1. Roof assembly classification of Class 1 Construction, wind uplift requirements as listed below.

a. Wind Uplift Certification: Submit a Letter from the manufacturer of the roofing system that all products manufactured by them including the specific insulation, adhesives and/or fasteners, are included in the specified Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7 for a **120 MPH three (3) second wind gust**.

b. All products shall be listed as Factory Mutual-certified a minimum of one (1) year prior to the date of installation. Submit certifications for both base and top plies as a part of the submittals required for this project.

c. Material Certification: Written certification from the roofing manufacturer certifying that the insulation, insulation fasteners, flashings and accessory products provided by the roofing manufacturer are approved for use with the roofing system and are included in the 20-year No Dollar Limit warranty.

2. Contact roofing manufacturer's technical representative for additional information.

C. Underwriters Laboratories, Inc. (UL):

1. Class A Fire Hazard Classification, as tested in accordance with UL 790.

D. Insulation Criteria:

1. Polyisocyanurate foam insulation shall bear a label certifying that a thermal value was determined in accordance with ASTM C-1289-01.

2. Insulation supplied shall be acceptable to the membrane manufacturer.

E. ANSI/SPRI Wind Design Standard for Edge Systems used in Low Slope Roofs – all roof edge systems shall comply with the requirements of Chapter 16 of the current Building Code of New York State and tested for resistance in accordance with Test Methods RE-1, RE-2 and RE-3 of the current ANSI/SPRI System Requirements ES-1 Wind Design Standards.

1. Products shall be manufactured in specified manufacturer's facilities. Products fabricated by installer or other fabricator will not be acceptable unless fabricator can demonstrate to Architect's satisfaction that products have been tested for resistance in accordance with Test Method RE-1 and RE-2 of ANSI/SPRI ES-1.

1.10 PRELIMINARY / PRE-INSTALLATION ROOFING CONFERENCE

A. Before starting roof deck construction, conduct conference at Project site. Comply with requirements for pre-installation conferences as indicated within Division 01 Specifications. Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer (if applicable), testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

2. Review means, methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review Project Safety Plan for site conditions, enforcement, compliance, or Owner-imposed restrictions that may be required.

4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Examine site for approved staging areas, disposal sites, and document existing conditions prior to contractor mobilization. Establish scope of work for site restoration and responsibilities.

6. Examine site for condition and completion of areas adjacent to work area. Establish protection required for existing surfaces.

7. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

8. Review structural loading limitations of roof deck during and after roofing operations.

9. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

10. Review governing regulations and requirements for insurance and certificates if applicable.

11. Review temporary protection requirements for roofing system during and after installation.

12. Review work limitation by contractor including; start times, end times, days of the week, noise mitigation, fume control and any part of the work that would effect normal building operations.

13. Review trade coordination necessary for job completion.

14. Review roof observation and repair procedures after roofing installation.

B. Convene prior to commencing work of this section at a time and location to be determined by the Owner or Owner's Representative.

1. All parties responsible for work of this section are required to attend including the Architect, Owner, Contractor, and any other trades involved in the roofing work.

C. The agenda for the Pre-Roofing Conference shall include:

1. Review of all systems and materials to be used in the installation of new roofing, installation procedures and coordination required with related work.

2. Review and coordination of all substrate preparation and related work, including installation of curbs or similar items by others.

3. Review and modify roofing applicators proposed sequencing of the work.

4. Inspect and make notes of job conditions prior to installation.

5. Supply to the Owner’s Representative, a letter from the corporate offices of the roofing manufacturer, which states the name, title, address and phone number of the factory-supplied representatives who will be assigned to this project. No exceptions will be made for this item.

1.11 DELIVERY, STORAGE, HANDLING AND DISPOSAL

A. Deliver all materials and store in their unopened original packaging and rolls with labels intact and legible, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard. Allow no unlabeled materials on site.

B. Deliver materials requiring fire resistance classification to the job with labels attached and packaged as required by labeling service.

C. Deliver materials in sufficient quantity to allow continuity of work.

D. Handle rolled goods as to prevent damage to edge or ends.

E. Select and operate material handling equipment so as not to damage existing construction or roofing.

F. Provide continuous protection of materials against wetting and moisture absorption. Store materials a minimum of 6" off the ground, in a dry, well ventilated place protected from the weather. Enclosed trailers are recommended. Heated or Air-Conditioned storage is required for temperature-sensitive items.

G. Properly tie down insulation to prevent blow off. **No material is to be stored on the roof at any time**. Do not point load roof. Do not store any flammables on the roof.

H. Protect materials against damage by construction traffic.

I. Comply with fire and safety regulations.

J. Protect membrane and flashing materials against coming in contact with coal tar pitch, petroleum, grease, oil, solvents, or other waste products. After exposure to pitch of other waste products, remove contaminated membrane and flashing material from site.

K. Protect materials during delivery to site. Keep materials in safe, dry storage at temperatures recommended by their manufacturers. Materials shall be labeled for ready identification, Label shall include name of manufacturer. **Store materials in a manner so that no direct contact is made with the ground.**

   Storage and Handling: Store materials in a dry, well-ventilated place protected from the weather.

   1. Do not store materials so as to overload the deck or structural assembly; do not stockpile aggregate surfacing materials on roof. Prepare staging for aggregate stockpile that will prevent contamination of the material.

   2. Store all materials on 4” min raised platforms covered with properly secured breathable water resistant covers. Slit shrink wrapping to not permit condensation and cover with breathable tarp.

   3. Mark for clear and evident identification all materials that have been subject to moisture. Remove all materials that become wet from the site.

      a. Store volatile liquids in a separate storage building or trailer, or remove from the site at the end of each workday.

   4. Store volatile liquids at temperatures recommended by the manufacturer.

   5. Do not remove materials from factory packaging until ready for use. Handle roll goods with care; do not use roll goods which have been damaged.

   6. Store adhesives and sealants at temperatures between 60°F and 80°F.

L. **Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.**

M. In the event of damage, immediately make all repairs and replacements required by the Owner's Representative.

N. **Disposal:** All removed materials become the property of the Contractor. Inspect all ground areas surrounding roof on a daily basis for loose debris; immediately move all debris off the roof and into approved dumpsters, ready for legal disposal off-site. Dumpster staging areas must be kept neat and tidy; do not allow to overflow. All debris must be transported to a legal dumpsite or recycling facility, and documentation of each load must be maintained by the Contractor.

1.12 QUALITY ASSURANCE

A. Submit written certification from the roofing membrane manufacturer certifying that the proposed roofing assembly, compatibility of materials and total R-Value of the insulation system meet or exceed these specification requirements. Letter shall state that the specifications and drawing details are acceptable to them for the deck and surfacing to which they are to be applied, that there is a compatibility of all materials provided, and the total R-value of the proposed insulation system. Membrane manufacturer shall also submit a letter certifying that the manufacturer has been actively marketing the submitted system for a minimum of five (5) years.

1. If details for any manufacturer's system proposed in the Contract Documents are not acceptable to the manufacturer, submit corresponding details proposed for the particular application, together with the manufacturer's reasons for not accepting the conditions depicted in the specifications or drawings. No alternate details will be considered without evidence of valid objections on the part of the manufacturer to the contract requirements.

2. No deviation is to be made from this specification without prior written approval by the manufacturer; submit such approval to the Architect.

3. The roofing system manufacturer must provide inspection of guaranteed roofing systems by company employed, salaried personnel dedicated to Technical Services. Sales representatives or sales agents will not be permitted to conduct quality assurance inspections or grant final manufacturers acceptance.

B. EPDM Roofing Applicator Requirements: refer to 1.08-A of this Section.

C. EPDM Roofing Manufacturer Requirements: refer to 1.08-B of this Section.

D. Material Requirements/ Source Limitations:

1. Obtain all membrane sheets, insulation, flashings, prefabricated gravel stops and copings, and all temporary roof materials from a single manufacturer.

E. UL Rating:

1. Provide EPDM membrane and insulation that has been classified by Underwriters Laboratories as a component of Class A roofing system.

F. Wind Uplift:

1. Refer to Article 1.09 of this section.

G. Inspection: Prior to, during installation, and at completion of the installation, an inspection shall be made by a representative of the manufacturer in order to ascertain that the roofing system has been installed according to their published specifications, standards, and details.

1. Warranty will be issued upon approval of the installation (see 1.15 of this section).

H. Test Reports: Provide:

1. **Roof drain and leader test or submit plumber's verification.**

2. **Roof deck adhesive test to be completed by the selected contractor prior to start of their work by a third party company.**

I. **Fire-Test-Response Characteristics:** Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-test Exposure: Class A; ASTM E108, for application and roof slopes indicated.

1.13 JOB CONDITIONS

A. Surfaces on which the roofing membrane system is to be applied shall be clean, smooth, dry, and free of fins, sharp edges, loose and foreign materials, oil and grease.

1. Before beginning work, the authorized representative of the manufacturer shall examine the roof surfaces in order to ensure that all substrates are acceptable, and will ensure the NDL Warranty requirements of this contract.

B. Examine the substrate and the conditions under which roofing work is to be performed, and notify the Architect in writing of unsatisfactory conditions. The Contractor will schedule a coordinated field meeting with the Architect and the authorized manufacturer's representative to review said conditions prior to proceeding with the work. Do not proceed with any work until all unsatisfactory conditions have been corrected.

1. All surface voids greater than 1/4" wide (or limitations as recommended by the roofing manufacturer) shall be properly filled with an acceptable fill material.

C. Moisture Protection:

1. Cover, seal or otherwise protect the roof and flashings so that water cannot accumulate or flow under completed portions. When and where necessary to accomplish this, provide temporary water cut-offs in accordance with the membrane manufacturer's written specifications.

D. Environmental Conditions:

1. Do not smoke or use open flames.

2. Do not apply insulation or roofing materials during rainstorms.

3. Do not apply roofing sheets when wind conditions are such that is difficult to handle the sheets.

4. Proceed with roofing work only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

5. Do not start roofing if rain is imminent, or ambient temperature is below 40 degrees F.

6. If rain occurs during roof membrane application, cease operations and protect deck, insulation, penetrations and membrane from water damage and intrusion.

7. Provide and maintain fire extinguishers.

8. Comply with all fire regulations. Ensure properly rated, charged, and inspected fire extinguishers are on the roof and staging area.

E. Protection:

1. Take necessary precautions to prevent damage of any kind to adjacent material and work for other trades.

2. Provide protection to prevent damage or staining of building surfaces, paved areas and plantings.

3. Provide enclosed chutes for removing debris from roof level, to roof level and to vehicles below. Do not throw debris from roof level.

4. Protect areas of deck repair at the end of each working day. Protection shall be watertight.

5. Provide and maintain operating water pumps on each roof area to keep areas free of water accumulation. Pump water through hoses of sufficient size to functioning roof drains.

6. Drain Verification:

a. Prior to start of roofing removals, in the presence of the Owner's representative, verify that existing roof drains are operational and are not plugged.

b. Submit in writing that the verification of roof drains has been performed. Include listing and location of non-operational drains.

F. Limit removal of existing roofing to the amount (or areas) that can be replaced with the complete new roofing system (including insulation, membrane, flashing, gravel stops, and related work) in a single working day, maintaining a completely watertight covering on the roof.

1. At the end of each work day, or when weather conditions outside manufacturer's recommended limits are predicted, provide and install temporary waterstops as recommended by the roofing manufacturer.

a. Permanent roof insulation shall not be installed as base for temporary waterstops.

b. Remove temporary waterstops completely before installing permanent roofing system.

1.14 WARRANTY AND GUARANTEES

A. Contractor's Guarantee: Furnish contractor's guarantee in accordance with Section 017000 for all materials and workmanship starting from date of Substantial Completion. Replace defective roofing at no expense to the Owner.

B. Manufacturer's Guarantee: Furnish manufacturer's twenty (20) year Guarantee similar or equal to

1. Johns Manville's "Peak Advantage No Dollar Limit Roofing System Guarantee".

2. Carlisle Syntec's "Golden Seal Total Roofing System No Dollar Limit Edge to Edge Warranty".

Include year membrane guarantee. Guarantee shall cover both labor and materials necessary to effect repairs, with No Dollar Limit as to effect roof repairs and accidental puncture up to 16 man-hours per year and one hail damage. Single-source special warranty includes: roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover board, walkway

products, manufacturer's expansion joints, membrane edge metal products (Edge to Edge) and other single-source components of the roofing system marketed by the manufacturer.

1. Guarantee shall include a wind rider for the repair of damages to roofing system caused by winds up to and including **three-second gust of 120 MPH, 33 feet off the ground** as defined by the Beaufort scale.

C. These specifications may require more than what the manufacturer may require for providing a warranty for the roofing system.

D. The NDL Warranty shall be accompanied by a letter from the manufacturer's corporate office, attesting that the entire roofing installation was inspected during the complete course of the project by the factory-authorized representative, who shall be named, and that the entire installation is certified compliant to the manufacturer, and worthy of the required warranty.

1. The NDL warranty shall include, but not be limited to the following conditions:

   a. Cracking due to expansion or contraction of the membrane.

   b. Deterioration due to exposure to the elements.

   c. Decomposition of membrane due to ponding water.

   d. Separation of factory and field fabricated seams and joints.

   e. Cracking or deterioration of membrane materials from trapped water vapor under membrane.

   f. Separation of or decomposition of membrane flashing.

   g. Wind damage sustained up to Factory Mutual Class I-110 classification.

2. Provide that in the event the roofing system fails to perform, the roofing systems manufacturer will, at its own expense, cause to be made the repairs or modifications to the roofing system necessary to affect water-tightness and will re-inspect the roof and reissue the guarantee after reinspection.

3. In the event repairs are required due to natural disasters, unauthorized alterations, or other causes specifically excluded in the guarantee, the manufacturer will reinspect the roof and reissue the guarantee provided that the methods and materials used in the repair have received prior approval by the manufacturer and the repairs are accomplished by an approved applicator.

4. The manufacturer shall inspect the roof area under this contract every five (5) years of the duration of the warranty period and will provide written observation and associated specific maintenance recommendations, as applicable, to the Owner.

E. **The Contractor is to cover damages to the building resulting from failure to prevent penetration of water during construction.**

F. Pro-rated System Warranties shall not be accepted.

G. Warranty Period: Twenty (20) years from the date of Substantial Completion and must include a 120 mph wind speed rider as required by ASCE-7 of the Building Code of the State of New York.

H. Manufacturer shall have a minimum AAA credit rating; provide written verification of same to Architect as a part of the submittals for this project.

I. **Applicator's Guarantee:**

1. **Special Project Warranty: Submit roofing installer's warranty, signed by the Installer, covering the work of this section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, perimeter metals and walkway products, for the following warranty period: 2 years.**

1.15 LABORATORY TESTING

A. Upon request from the Owner or Architect, the roofing membrane manufacturers shall supply, at their expense, the results of mechanical and chemical testing performed on the materials supplied.

B. The tests shall be performed to certify compliance with the standards referenced under this section.

1.16 SITE PROTECTION

A. During roofing work, exposed surfaces of finished walls and ground shall be protected with tarps in order to prevent damage. Contractor shall assume full responsibility for any damage.

B. All work relative to this roof project shall include the use and installation of temporary partitions as necessary and required to adequately satisfy the needs for the separation of construction requirements of Section 013500.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. For the purposes of this specification, and to identify a minimum level of quality, the design is based on the use of either:

1. Johns Manville Roofing Systems Group; Denver, CO.

2. Carlisle Syntec Products; Carlisle, Pa.

3. Or an approved equal by the Architect.

B. **Such references shall be construed only as establishing the quality of materials and workmanship to be used under this section, and shall not, in any way, be construed as limiting competition by other manufacturers offering products of identical material composition. Products used shall be those upon which the design is based, or shall be equal products, by the Architect.**

C. **Bidders / Applicators seeking approval for substitute materials shall submit their request in writing to the Architect in accordance with the requirements of the Project Manual.**

2.02 ROOFING MEMBRANE

A. Ethylene Propylene Diene Monomer (EPDM) – rubber roofing membrane-compounded elastomer meeting the following properties: Specifications are based on:

1. Johns Manville's **JM EPDM R 60 FR** Reinforced Membrane sheet with Factory Inseam Tape: 4 inch (101.6-mm) wide butyl splice tape with release film

2. Carlisle Syntec's **Sure-Tough 60-mil** Reinforced EPDM (Ethylene, Propylene, Diene Terpolymer) in the largest sheet possible with 3" or 6" Factory-Applied Tape (FAT).

B. Reference Standard: ASTM D4637, Type II.

C. Typical Physical Properties:

1. ASTM D751 - Thickness (min., sheet-overall): 0.060 inches.
2. ASTM D412 - Tensile Strength (min.): 1305 psi (9.0 MPa).
3. ASTM D5635 - Dynamic Puncture Resistance: Pass.
4. ASTM D5602 - Static Puncture Resistance: Pass.
5. ASTM D751 - Elongation (Ultimate, min.): 300%.
6. ASTM D412 - Tensile (set, max.): 10%.
7. ASTM D624 - Tear Resistance (min.): 110 lbf/in. (26.27 kN/m).
8. ASTM D2137 - Brittleness Point (max.): -45°C (-49°F).
9. ASTM D1149 - Ozone Resistance (no cracks): Pass.
10. ASTM D573 - Heat Aging:

    a. ASTM D412 - Tensile Strength (min.): 1250 psi (8.3 MPa).
    b. ASTM D412 - Elongation (ultimate, min.): 200%.
    c. ASTM D624 - Tear Resistance (min.): 125 lbf/in. (21.0 kN/m).
    d. ASTM D751 - Linear Dimension Change (max.): +/-1%

11. ASTM D471 - Water Absorption (max.): +8/-2 mass %.
12. ASTM G151 - Weather Resistance: G-151,

    a. ASTM G155 - Visual Inspection: Pass.
    b. PRFSE (min.): 30%.
    c. Elongation (Ultimate, min.): 200%.

D. Membrane Layer Securement: Adhered. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

1. JM EPDM Membrane Adhesive (Low VOC)

2. Carlisle Syntec EPDM x-23 Low-VOC Bonding Adhesive

E. Installation Accessories:

1. Detail Membranes and Strips:

    a. EPDM Peel & Stick Flashing: A 6-inch or 12-inch wide, uncured EPDM sheet, with a factory laminated, self-adhering EPDM/butyl tape. Product shall be similar or equal to:

        1) JM EDPM Peel & Stick Flashing
        2) Carlisle EPDM PS Elastoform Flashing

    b. EPDM Peel & Stick Sealing Strip: A 6-inch, 9-inch or 12-inch wide EPDM strip, with factory laminated, self-adhering seam tape. Product shall be similar or equal to:

        1) JM EDPM Peel & Stick Sealing Strip
        2) Carlisle PS Cured Cover Strip

    c. EPDM Seam Tape: A 6-inch wide, self-adhering, cured EPDM/butyl rubber splice tape for use between EPDM sheets. Product shall be similar or equal to:

1) JM EPDM Seam Tape
2) Carlisle Sure Seal Seam Tape

d. EPDM Reinforced Termination Strip (RTS): A black, 6-inch wide, 45 mil thick, polyester scrim-reinforced, cured EPDM strip. Product shall be similar or equal to:

1) JM EPDM Reinforced Termination Strip (RTS)
2) Carlisle EPDM Reinforced RUSS Strip

e. EPDM Reinforced Termination Strip (RTS) With Tape: A black, 6-inch wide, 45 mil thick, polyester scrim-reinforced, cured EPDM strip with a factory-laminated, 3 inch self-adhering seam tape. Product shall be similar or equal to:

1) JM EPDM Reinforced Termination Strip (RTS) With Tape.
2) Carlisle EPDM Reinforced RUSS Strip

2. Manufacturer Pre-Molded Flashings:

a. EPDM Peel & Stick Inside/Outside Corners: A 60 mil thick, uncured flashing with a pre-applied peel and stick tape. Product shall be similar or equal to:

1) JM EPDM Peel & Stick Inside/Outside Corners
2) Carlisle EPDM PS Inside/Outside Corners

b. EPDM Peel & Stick T-Joint Patches: An 8” x 8” wide, uncured EPDM sheet with a factory laminated, self-adhering EPDM/butyl tape. Product shall be similar or equal to:

1) JM EPDM Peel & Stick T-Joint Patches
2) Carlisle EPDM PS T-Patches

c. EPDM Peel & Stick Pipe Boot: A conically stepped pre-molded EPDM membrane with a pressure-sensitive tape on the flange. Product shall be similar or equal to:

1) JM EPDM Peel & Stick Pipe Boot
2) Carlisle EPDM PS Pipe Boot

d. EPDM Pipe Boot: A conically stepped pre-molded EPDM membrane. Product shall be similar or equal to:

1) JM EPDM Pipe Boot
2) Carlisle EPDM PS Pipe Boot

3. Sealants and Coatings:

a. Sealing / Water Cutoff Mastic: A one-component, low viscosity, self-wetting, butyl blend sealant. Product shall be similar or equal to:

1) JM Sealing Mastic
2) Carlisle Water Cut Off Mastic

b. EPDM Tape Primer: A solvent-based primer for seaming EPDM laps. Product shall be similar or equal to:

1) JM EPDM Tape Primer
2) Carlisle EPDM Low VOC Primer

4. Liquid Flashing: two-component polyurethane-based system which creates a reinforced, cold-applied liquid flashing that is compatible with all EPDM, TPO, PVC, and KEE HP membranes:

    a. Carlisle LIQUISEAL® Liquid Flashing

5. EPDM Walk Pad:

    a. EPDM Walkpads: A heavy-duty, non-porous, solid rubber walk pad. Product shall be similar or equal to:

        1) JM EPDM Walkpads
        2) Carlisle EPDM Walkway Pads

        Typical Physical Properties:

            a) ASTM D297 - Specific Gravity, Water Displacement Method - Specific Displacement Method: 1.06-1.15 gm/cm.
            b) ASTM D624 - Tear Resistance Die C: Specimens Tested at 20 in./min. (500 mm/min.): 250 lbs./in (43.8 kN/m).

6. Edge Strip:

    a. Tapered Fesco Edge Strip: Shall be manufactured from Fesco Board, which is composed of expanded perlite, a volcanic ore, and blended with selected binders and fibers. Product shall be similar or equal to: Tapered Fesco Edge Strip.

        Reference Standard: ASTM C728.

        Typical Physical Properties:

            a) ASTM C209 - Water Absorption (% by Volume - 2 hours): 1.5 maximum.
            b) ASTM C165 - Compression Resistance:

                i. 5% Consolidation: 30 psi (207 kPa).
                ii. 10% Consolidation: 40 psi (276 kPa).

            c) ASTM C209 - Laminar Strength: 7 psi (48 kPa).
            d) ASTM C203 - Flexural Strength: 65 psi (448 kPa).
            e) ASTM C209 - Product Density: 9 psf (144 kgs./m3).
            f) ASTM C209 - Dimensional Stability: 0.5% maximum.

        Drains: Provide similar or equal to Hercules RetroDrain.

7. Expansion Joint Covers:

    a. Expand-O-Flash Styles: CF, CFEJ, EJ, EJ/WC

8. Roof Edging System - Fascia: (Where shown on drawings)

    a. Provide a decorative metal fascia with continuous extruded aluminum bar to terminate roofing at perimeter. Provide watertight system with no fasteners. Product to be similar or equal to:

        1) JM Presto-Tite
        2) Carlisle Securedge 2000

        Typical Performance Characteristics:

a) Provide meeting or exceeding the requirements of ES-1 and IBC.
b) Provide extruded bar locks membrane.
c) Provide injection-molded EPDM anchor bar thermal expansion splices.
d) Provide a fascia that freely thermally cycles on extruded bar.

Typical Physical Properties:

a) Provide fascia metal gauge: .040” thick formed aluminum.
b) Provide fascia: Standard 12’-0” (3.65 m) lengths.
c) Provide extruded bar: Continuous 6063-T6 alloy aluminum in 12’-0” (3.65 m) standard lengths with pre-punched slotted holes and all bar miters welded.
d) Provide fasteners: #9 x 2” stainless steel with drivers.
e) Provide exterior fascia finishes: Under Base Bid costs, the Architect shall have the option to choose from: natural mill finish, Kynar 500 from manufacturer’s standard colors, custom color Kynar 500, or clear or color anodized. No additional charges shall be made to Owner for Architect’s selection.

Accessories:

a) Provide miters, downspout scuppers, and spill-out scuppers as fabricated by the manufacturer.
b) Employ welded base assembly to maintain watertight integrity.
c) Provide matching brick wall cap, downspout, extenders or other special fabrications as detailed.

9. Roof Edging System - Coping: (Where shown on drawings)

a. Provide a decorative metal coping with continuous extruded aluminum bar to terminate roofing at perimeter. Provide watertight system with no fasteners and butt-type joints with concealed splice plates. Product to be similar or equal to:

1) JM Metal Presto-Lock
2) Carlisle Securedge 200

Typical Performance Characteristics:

a) Provide design that allows coping sections to expand and contract freely, while locked in place on anchor cleats.
b) Provide design that allows coping sections to be locked to extruded aluminum anchor bar and anchor cleats by mechanical pressure from hardened stainless steel springs factory-attached to the anchor cleats.
c) Provide all splice plates, include factory-applied dual non-curing sealant strips capable of providing a watertight seal.

Performance Requirements:

a) 20 Year, 110 mph Wind Warranty.
b) Tested per ANSI/SPRI ES-1 Standard to comply with the current New York State Building Code.
c) Factory Mutual 1-90 approved for wind up lift protection.
d) Miami-Dade Approved (No. 13-0419.03 12/11/18) to comply with the "High Velocity Hurricane Zone of the Florida Building Code”.

Typical Physical Properties:

b) Coping Cover:

i. Provide snap-on cover, 12 feet (3.65 m) long, with matching 8 inch (203 mm) wide concealed splice plate and two factory-applied non-curing sealant strips.

ii. Provide .050 inch (1.3 mm) thick aluminum in with Kynar 500 finish.

c) Extruded Anchor Clip:

i. 12 inch (304 mm) long, 20 gauge (1.0 mm), G-90 galvanized steel anchor clip with two hardened stainless steel springs per clip.

d) Fasteners:

i. Provide corrosion-resistant #12 x 1-5/8 inch (41 mm) long, with hexagonal head and 5/8 inch (16 mm) bonded washer with EPDM washer seal.

ii. Provide equivalent corrosion-resistant fastener of type and size required for specific substrate types.

e) Accessories:

i. Provide miters, downspout scuppers, and spill-out scuppers fabricated by manufacturer.

ii. Employ welded base assembly to maintain watertight integrity.

iii. Provide matching brick wall cap, downspout, extenders or other special fabrications as detailed or required for a complete and proper project.

2.03 WOOD BLOCKING, PLYWOOD AND CANTS

A. Blocking Thickness: Size as indicated or required to bring blocking flush with top surface of insulation and tapered edge strips.

B. Plywood Thickness: As required to bring wood blocking flush with top surface of insulation and tapered edge strips.

C. Install plywood on all masonry surfaces contaminated with asphalt or coal tar.

D. Species: Southern Yellow Pine.

E. Treat on all surfaces, including field cuts.

F. All nailers and blocking material to be free of wane, shake, decay or checks, and pressure treated with water-borne preservatives for above ground use, AWPA LP-2. Standard and kiln dried to a maximum of 19% moisture content. Wood shall be dressed on all sides.

1. Shall be #2 or better lumber, and conform to the current JM and NRCA recommendations on wood nailers as well as conform to the FM Global Loss Prevention Data Sheet 1-49. Creosote and asphaltic preservatives are not acceptable.

G. In order to provide minimum tapered insulation profiles as necessary, the contractor may need to provide alternate perimeter blocking (and fastening) details, based on verified field conditions. The cost of any field modifications required shall be at no additional cost to the Owner. All blocking attachments shall be certified by a NYS licensed Professional Engineer (who is retained by the Contractor on a consultant basis) certifying that the connections as designed meet or exceed the wind uplift requirements of the roofing system.

2.04 INSULATION

A. Tapered: Tapered R30 minimum

1. JM Energy 3
2. Carlisle Insulbase

a. Polyisocyanurate foam with fiberglass facer on both sides. Manufactured using Pentane as a blowing agent.
b. ASTM C1289-01, Type II, Class I, Grade II (20 psi)
c. Maximum Panel Size: 4 feet x 4 feet. R-value: 5.7 per inch.
d. Tapered Insulation: 1/8 inch per foot.
e. Taper crickets 1/4 inch per foot crickets. R-value: 5.7 per inch.
f. Compressive Strength: 20-psi minimum at any point. ASTM D1621-73.
g. Flame Spread: 25 or less, ASTM E-81-81.
h. Moisture vapor transmission: ASTM C355, less than 1 perm.
i. Water absorption: ASTM C209, less than 1%.
j. Dimensioned stability: ASTM D2126, 2% maximum 24 hours.
k. Factory Mutual approved and Underwriter's Laboratories listed.

B. Flat Stock: Base Layer –20 psi (minimum R Value of 30.) Two (2) layers of 2.6 inch in Structurally Sloped areas.

1. JM Energy 3
2. Carlisle Insulbase

a. ASTM C-1289-01. Type II, Class I, Grade II.
b. Polyisocyanurate foam, fiberglass facer on both sides, manufactured using Pentane as the blowing agent.
c. "R" value: 5.7 per inch
d. Compressive Strength: 20 psi minimum, ASTM D1621-73
e. Flame Spread: 25 or less, ASTM E-81 81.
f. Moisture vapor transmission: ASTM C355, less than 1 perm.
g. Water Absorption: ASTM C209, less than 1%.
h. Dimensioned stability: ASTM D2126, 2% maximum 24 hours.
i. Factory Mutual approved and Underwriter's Laboratories listed.

C. All insulation shall meet or exceed the following requirements when tested in accordance with ASTM E-84:

a. Flame spread less than 25.
b. Smoke developed less than 450.
c. Fuel contributed less than 100.

2.05 ROOF COVER BOARDS (one of the following)

A. Cover Boards

1. Top Layer: Johns Manville's Invinsa Roof Board or Carlisle Securshield HD Plus

a. Cover Board: 1/4 Inch thick.
b. High Density closed cell polyisocyanurate foam board with clay-coated fiber glass facer.
c. Minimum Compressive strength: 150 psi (1034 kPa).
d. Flexural Strength: 2000 psi, ASTM D 1037; 28 lbf ASTM 1037
e. Dimensional Stability: >0.6%, ASTM 2126
f. Moisture Vapor Permeance: <1 perm, ASTM E 96

g. R-Value: 1.0 (hr•ft2•˚F)/Btu, ASTM C 518
h. Water Absorption (max) 2.6%, ASTM C 209
i. Surface Water Absorption: <1 gram, ASTM C473
j. Mold Resistance: Pass, ASTM D 3273
k. Weight per 4 x 8 Sheet: 12 lbs (plus or minus 2 lbs)

2. Top Layer: DEXcell roof board manufactured by National Gypsum Corp or Dens Deck Primed roof board manufactured by Georgia Pacific, supplied by Carlisle

3. High Density Gypsum Core Roof Cover Board: Provide gypsum core panel acceptable to the roofing system manufacturer and complying with Factory Mutual requirements for FM approval for Class 1. Gypsum core panel shall be 5/8th inch thick primed fire stop Type X, gypsum core with fiberglass matte facing on both sides. Gypsum core panel shall be fire resistant and meet UL 790 with a Class A Fire Rating.

Typical Physical Properties:

1. Thickness: 5/8 inch, nominal.
2. Width: 4 feet (1.22 m).
3. Length: 4 feet (1.22 m), standard.
4. ASTM C473 Method B, Flexural Strength: Parallel 100 lbs. min.
5. ASTM E96 Moisture Vapor Permeance: <23 perm [1314 ng/(Pa•s•m2)]
6. ASTM C518: R-Value 1.0 (hr•ft2•ºF)/Btu (0.18 (m2•ºC)/W).
7. ASTM C473, Water Absorption: 10% max.
8. ASTM D1621 Compressive Strength: 900 psi,
9. ASTM C473 Surface Water Absorption: <1 gram.
10. ASTM D3273 Mold Resistance: Pass.

2.06 GYPSUM SUBSTRATE BOARD FOR CEMENTITIOUS WOOD FIBER AND STEEL DECKS

A. Provide Gypsum Core panel acceptable to the roofing system manufacturer and complying with Factory Mutual requirements for FM approval for Class 1.

B. Gypsum core panel shall be 1/2 inch thick primed fire stop, treated gypsum core with a heavy duty coated fiberglass facer,

1. JM DEXcell FA Glass Mat Roof Board by National Gypsum

2. Dens Deck Primed roof board manufactured by Georgia Pacific, supplied by Carlisle

C. Gypsum core panel shall be fire resistant with zero flame spread and zero smoke developed when tested per ASTM E-84 tunnel test method.

D. Provide Gypsum core panel on all steel and concrete decks when they are in the same roof section as the Cementitious Wood Fiber decks.

2.07 SBS-SELF ADHERED VAPOR BARRIER FOR WOOD DECKS or DECKS WITH SUBSTRATE BOARD

A. Tri-laminate woven polyethylene, nonslip, UV-protected top surface, with a SBS Rubber and asphalt blend with low air and vapor permeability.

1. JM Vapor Barrier SA

2. Carlisle VapAir Seal 725 TR

B. Primer:

1. JM SA Primer Low VOC

2. Carlisle CAV-GRIP III Adhesive/Primer

2.08 SBS-MODIFIED VAPOR BARRIER FOR STRUCTURAL LIGHT WEIGHT, CONCRETE AND GYPSUM DECKS

A. SBS Membrane Vapor Barrier: Thermally fused, Fiberglass reinforced, SBS Modified asphalt sheet; smooth surfaced; suitable for application method specified. Product shall conform to the requirements of ASTM D 6163, Type I, Grade S.

1. Johns Manville DynaBase HW

2. Carlisle Syntec VapAir Seal 725 TR or Sure TG 90 Base Sheet

a. Description: SBS modified bitumen applied onto a fiberglass mat with a sanded underside and high brush sanded topside surface. Nominal thickness – 114 mils.

b. Physical Properties:

1) Minimum Thickness: 90 mil (2.29 mm), minimum.
2) Tensile Strength @ 0°F (-18°C):
   a) Machine Direction: 105 lbs. force/in. width (18.4 kN/m), minimum.
   b) Cross Machine Direction: 95 lbs. force/in. width (16.6 kN/m), minimum.
3) Elongation @ 0°F (-18°C):
   a) Machine Direction: 5%
   b) Cross Machine Direction: 5%
4) Tensile-Tear:
   a) Machine Direction: 100 lbs. force/in. width (17.5 kN/m), minimum.
   b) Cross Machine Direction: 90 lbs. force/in. width (15.75 kN/m), minimum.
5) Low Temperature Flexibility: -30°F (-34°C).
6) Dimensional Stability:
   a) Machine Direction: 0.1% change.
   b) Cross Machine Direction: 0.1% change.

2.09 INSULATION SECUREMENT AND MEMBRANE SECUREMENT FOR TECTUM DECKS

A. Insulation securement shall be:
1. Johns Manville Polymer Auger Fasteners and Plates

2. Carlisle Syntec Gyptec Fasteners and Plates

And shall follow the requirements for spacing and fastener length.

B. Membrane layer securement shall be:

1. JM RetroDriller Fastener

2. Carlisle HP Purlin Fastener

Designed for attaching Single-Ply membrane systems to structural steel purlins. The fastener has a Phillips head and nominal shank diameter of .194 and a thread diameter of .230. Fastener must have corrosion-resistant CR-10 coating, exceeding FM Global Approval Standard #4470 corrosion

requirement. The point shall have a ½-inch drill point that can quickly drill into structural purlins a minimum of 1 inch.

2.10 INSULATION SECURE AND MEMBRANE SECUREMENT ON STEEL DECKS

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates on Steel decks meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer.

1. JM High Load Fasteners (#14) and RhinoPlates

2. Carlisle HP-X Fastener and Rhinobond Plates

2.11 POURABLE SEALERS

A. Two-component compatible with materials with which it is used.

B. Carlisle One-Part or two-part Pourable Sealer

2.12 FASTENERS

A. Wood Blocking:

1. No. 14 screws with fluorocarbon coating that penetrate the nailer below 1 ¼ inches. Set in two rows staggered at 12 inches on center. Designed for securing wood to wood.

2. Spiral shanked galvanized nails that penetrate the nailer below 1 ¼ inch. Set in two rows staggered at 12 inches on center.

2.13 DECK REPAIR

A. Furnish and install a fast setting concrete mix, Product: Quikrete Fast-Set.

2.14 ROOF CURBS

A. Provide a minimum of one row of wood blocking to top of existing curb to raise the flashing a minimum of 12 inch.

2.15 EXPANSION JOINTS (Where indicated on drawings)

A. Provide new expansion joint cover, curb to wall and/or curb formed, 4” wide and 4” vertical.

2.16 ROOF DRAINS

A. **For New Construction roofs**,

1. Single Drain (Primary Only) Model ZC100-DP-EA-VP as manufactured by Zurn, or approved equal by Architect.

2. Double Drain (Primary with Overflow) Model ZC163-DP-EA-VP-W4 as manufactured by Zurn, or approved equal by Architect.

3. Overflow Drain Downspout nozzle Z-199 SS as manufactured by Zurn, or approved equal by Architect.

B. **For Existing Roofs**, The Contractor shall remove the existing Roof Drain Dome Strainers and Flashing Clamp Rings and discard, clean and prep remaining drain bowl assembly for new roofing. Contractor to Install New Cast Iron Dome Strainers, Flashing Clamp rings and 2" Cast Iron Static Extension Ring, replace all missing or damaged components with new to match as manufactured by Zurn, or approved equal by Architect.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that Work of other trades, which penetrates the roof deck or requires personnel and equipment to traverse the roof deck, has been completed.

B. Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness that would prevent the execution, and quality of application, or the roofing system as specified. Do not proceed with application of the roofing system until all defects are corrected.

3.02 PREPARATION

A. Structural Concrete Decks; Surface Preparation:

1. Inspect concrete decks closely for smoothness, cracks over 1/8 inch, spalling, rust staining, excessive deflection, and moisture. Perform the manufacturer's dryness test to ensure that the deck is ready to receive the roofing system and that application medium bonds well to the surface.

2. Unacceptable areas should be brought to the attention of the General Contractor and Project Architect and must be corrected prior to installation of roofing system.

3. Ensure that all wood blocking has been installed as detailed in the plans and specifications, or as required for a complete and proper project.

4. Ensure that all counterflashing, receivers, curbs, etc. are constructed in such a manner as to provide a minimum 8" base flashing height measured from the finished roof's surface to the top of the base flashing membrane.

3.03 REMOVAL

A. Remove the existing roofing and insulation down to the existing deck along with all fasteners and plates, removing only that portion that can be made watertight at the completion of the workday or before any inclement weather.

B. Verify deck is clean and smooth, free of depressions, waves, or projections. All surfaces must be clean, smooth, dry, compatible and free of dirt, debris, oil/grease and gravel. Damaged or missing decking material must have new like materials installed so as to meet the requirements of the manufacture's written instructions for application of the new roofing.

C. Do not apply roofing materials to damp, frozen, dirty, dusty, or deck surfaces unacceptable to the manufacturer.

D. Surfaces that will receive roofing shall be in a condition ready to receive the required roofing per the manufacturer's requirements.

3.04 PHASE APPLICATION

A. Phase application of the roofing membrane will not be permitted. Apply all materials to the area during the same day that it is started, including making all areas watertight. All seams are to be sealed each day.

3.05 CONDITION OF SURFACE

A. Surfaces that will receive roofing shall be in a condition ready to receive the required roofing per the manufacturer's requirements.

B. Wood Deck: Verify securement, flatness, joint spacing, and slope of wood decking.

1. Replace damaged or defective areas prior to commencement of work under this section.

2. Seal joints of plywood with tape.

3. Fill knots with latex filler.

C. Clean the substrate of projections and substances detrimental to the work.

D. Install cant strips and similar accessories as shown and as recommended by the roofing systems manufacturer even though not shown.

1. Install wood nailers at the perimeter of the entire roof and around penetrations as indicated.

a. Anchor nailers to roof deck in accordance with Article 3.07, G, H and I.

E. Prime the substrate if recommended by roofing system manufacturer; comply with manufacturer's recommendations.

1. Prime the entire surface with the manufacturers Concrete Primer.

F. Coordinate roofing with flashings and other adjoining work to insure proper sequencing of the entire work.

G. Metal Deck: Verify securement and slope of metal decking.

1. Replace damaged or defective areas prior to commencement of work under this section.

2. Verify flutes of steel deck are clean and dry.

H. Concrete Decks:

1. Verify slope and condition of concrete decking.
2. Ensure flatness and verify tight joints of concrete deck.

3. Verify adjacent precast concrete roof members. Do not vary more than 1/4 inch in height. Verify grout keys are filled solid.

3.06 PREPARATION

A. No trace of surface water shall be present. Materials under roofing shall be completely dry. Sweep surface clean of dust, debris, and loose and foreign materials.

B. Start of application of roofing signifies acceptance of existing conditions.

3.07 WOOD BLOCKING, CANTS AND PLYWOOD

A. Wood blocking is required, as indicated in the details and drawings, and as required by existing field conditions, whether specifically detailed or not.

B. Provide new treated wood blocking where existing wood blocking that is not indicated to be removed is deteriorated.

C. Provide treated wood blocking at perimeter of roofing membrane, all sides of penetrations by roof accessories, mechanical curbs, and other areas where blocking is required by membrane manufacturer to nail membrane and flashing in place.

D. Blocking Thickness: Equal to thickness of insulation. (1/2 Inch).

E. Provide wood blocking to raise existing equipment curbs flashing heights; maintain 8 inches minimum height above membrane, or as required to obtain membrane roofing system manufacturer's 20-Year No Dollar Limit Warranty.

F. Provide wood blocking, and plywood at locations indicated.

G. In all areas where nailers are required, they shall be firmly anchored to the deck to resist a minimum force of 200 lbs. /lineal foot (2.9 kN/m) in any direction. A ½" (15 mm) of each end. Spacing and fastener embedment shall conform to FM Global Loss Prevention Data Sheet 1-49.

H. Secure wood blocking to wood blocking with 16d nails at 6 inches on center. Stagger nails on each side of blocking.

I. All woodwork to be reused shall resist a minimum force of 200 lbs. /lineal foot (2.9 kN/m) in any direction and shall be free of rot. If any existing woodwork is questionable, it shall be removed and replaced with suitable new materials.

3.08 INSTALLATION OF GYPSUM SUBSTRATE BOARD TO STEEL AND WOOD DECKS

A. Install the Substrate Gypsum board as per the manufactures written instructions but with not less than 16 fasteners per 4'x8' board on steel decks.

3.09 INSTALLATION OF VAPOR BARRIER ON STEEL AND WOOD DECKS

A. SA Primer is to be mixed well before use. Do not thin. Apply with roller or spray can. Apply uniformly with no streaks or puddles. Allow to dry completely. Primer should be tacky but should not transfer to a clean dry finger.

B. Apply SA Primer (low VOC) to top/exposed surface of the gypsum substrate board.

C. Roll out Vapor Barrier SA membrane over the areas that have received the SA Primer Low VOC. Be sure to stagger the end laps and overlap the side laps by a minimum of 3". Once the membrane is in the desired location, hold the membrane tight while peeling away the silicone release liner at an angle. Install additional rolls in the same way, with 3" side laps and 6" end laps. A minimum 75 pound split linoleum roller should be used over the entire surface and a 4" rubber roller should be used in the overlap areas.

3.10 INSTALLATION OF THE VAPOR BARRIER ON CONCRETE DECKS.

A. Prime the concrete deck with:

1. JM Concrete Primer at the rate of 1 gallon per 100 sq. ft. Allow primer to dry thoroughly.

2. Carlisle CAV-GRIP III Primer Apply CAV-GRIP III in an even coat to substrate keeping the spray tip approximately 12" (30.5 cm) away and perpendicular to the surface during spray.

B. Thermally fuse as per the manufacturer's recommendation and details the SBS Vapor Barrier to the primed concrete deck lapping end laps 6 inches and side laps 3 inches.

3.11 INSULATION AND COVER BOARD INSTALLATION

A. Adhered Insulation: Install each layer of maximum 4'x4' insulation and cover board and adhere to substrate as follows:

B. Starting at the low edge of the roof, install thermal layer and thermal protective layer in specified urethane adhesive.

C. Install boards with long joints continuous.

D. Stagger all joints from the board below.

E. Butt joints tightly.

F. "Occasional" joint widths up to 1/8" will be allowed. Fill all any widths greater than 1/8" with scrap thermal layer to achieve consistent surface.

G. Set thermal layer in a serpentine fashion using two-part urethane insulation adhesive applied in 3/4 inch wide beads at the following minimum rates:

1. Field: Beads at **4** inches on center
2. Perimeter: Beads at **4** inches on center
3. Corner: Beads at **4** inches on center

H. Place board into the adhesive while it is still tacky.

1. If adhesive reaches its tack-free state, remove and re-apply adhesive.

I. Press the thermal layer into the adhesive to a firm and uniform bearing.

1. Use ballast (sand bags or bagged rocks) on all four corners of the board for a minimum of 30 minutes to ensure contact of material and adhesive, if necessary.

J. Keep insulation absolutely dry at all times. Discard insulation that contains moisture.

K. Install only as much insulation as can be covered with roofing membrane the same day.

L. Repair any defects or installation errors prior to next phase of roof system installation.

3.12 INSTALLATION OF SINGLE PLY EPDM SHEET MEMBRANE

A. At the end of each day's work, protect the installed roofing and insulation by closing off edges of the system with water cut-off.

1. Remove water cut-off sealants completely and clean prior to resuming roofing application.

B. Position roofing membrane without stretching. Allow membrane to relax for approximately 30 minutes to one hour before fastening, splicing or securing membrane.

C. Adhered EPDM; starting at low edge, install EPDM membrane to properly prepared substrate following manufacturer's instructions for complete installation of a fully adhered membrane.

1. Begin by applying the sheets shingle fashion with all side laps perpendicular to the slope. Offset end laps a minimum of three (3) feet. Ensure the membranes overlap sufficiently to permit a six (6) inch lap. Position sheets so that lap seams are not "bucking" water. Fold sheet back one-half its width. Fold so that there are no wrinkles or buckles.

2. With a roller, evenly apply a coat of bonding adhesive to the exposed underside of the membrane and cover board. Apply adhesive evenly without puddles or globs. Do not apply bonding adhesive to splice areas. Allow the cement to dry until it is tacky, but does not string or stick when touched with a dry finger. Roll the coated membrane onto the coated substrate, avoiding wrinkling, stretching or buckling. (Remove all sheets that have wrinkles) Brush down bonded half of sheet with a good, stiff push broom or similar device to ensure a good contact, and adhesive bond. Fold back the other half of membrane, and repeat procedure for bonding. Install adjacent sheets with 4-inch lap edges.

3. At end lap areas, apply tape primer wash and allow to dry to the touch. Install seam tape over prepared bottom membrane. Roll the top EPDM sheet onto the seam tape, with the release paper still in place. Remove the seam tape by peeling it back parallel to the roof surface and away from the splice at a 45-degree angle.

4. Tape-to-Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

5. Hand-roll the seam: First, roll perpendicular across the entire splice and toward the outside edge. Then, roll along the length of the splice.
Note: Extend membrane over roof edges, covering the full height of wood blocking. Secure in place on face of blocking.

Install cant dam over top of membrane. Set cant dam in full bead of sealant mastic.

3.13 MEMBRANE SPLICING IN-SEAM TAPE

A. Fold un-bonded membrane back. Fold so that there are no wrinkles.

B. Clean both mating surfaces using clean fiber rags or natural sponges. Clean with primer/ wash cleaning agents approved by the roof manufacturer.

C. Roll 6-inch seam tape in a straight line at lap area. Peel off paper as roll progresses along seam line. In-seam tape not to exceed ¼-inch exposure along edge.

D. Roll the top membrane onto the adhesive, avoiding wrinkles and buckles.
E. Roll splice with 2-inch steel roller, using pressure toward the outer edge of the splice.

F. Clean the splice edge with cleaning agent approved by manufacturer.

G. Provide polyester reinforced termination strips at base of vertical surfaces, such as curbs, walls, roof hatches, skylights and roof top equipment.

3.14 LAP-SEAM COVER TAPE WHERE REQUIRED

A. Clean surfaces of membrane at areas of field seams with cleaning agent approved by manufacturer.

B. Install 6-inch wide self-adhering tape with roller using pressure toward the outer edge.

3.15 FLASHING

A. Preparation: Inspect all walls, curb heights, counterflashings, etc. and check for conformance with minimum base flashing height of eight (8) inches. Correct any non-conforming areas prior to installation of flashing.

B. Follow same procedures as described for cleaning, adhesive application, and lap sealant application.

C. EPDM Flashing Materials:

1. Install cured EPDM membranes for flashing of all straight walls, large curbs, and all large straight-sided penetrations.

2. Install uncured EPDM flashing or uncured EPDM Peel & Stick Flashing for flashing of all pourable sealer penetration pockets, vent pipes, scuppers, curbs, T-joints and inside/outside corners of wall flashings.

D. Primer: Prime all metal with tape primer/wash. Allow the primer to dry thoroughly.

E. Installation: Install reinforced termination strip per manufacturer's published details to secure field sheet at all walls and curbed penetrations. Adhere all EPDM Flashing membranes to any horizontal or vertical substrates with EPDM Bonding Cement.

1. Apply EPDM Bonding Cement evenly with a roller to flashing membrane and substrate. Allow to dry to tacky, so adhesive does not string when touched.

2. Roll the membrane into the substrate to avoid wrinkling or stretching. Take care to ensure that the flashing does not bridge at any change of plane such as the transition from the roof deck to a parapet wall.

3. Secure terminations utilizing aluminum compression bars or surface-mounted counterflashings directly to a smooth-sealed wall surface.

4. Fully extend flashings terminated with metal copings under the coping and mechanically fasten at a minimum of 1-1/2" down the face of the wall.
5. Flash all pipes with peel and stick flashing boots or an approved field flashing (as detailed in the manufacturer's specifications).

6. Install field sheet up and over wood blocking at all fascia or coping areas fastening the sheet on the outside face of the wood blocking.

7. At vertical surfaces apply EPDM flashing over polyester-reinforced termination strip. Extend flashing 4-inch minimum onto the roof surface and full height of curbs and vertically up walls a minimum of 12 inches unless indicated otherwise. Remove roof top equipment to extend flashing over the top of the curbs. Provide deck overlayment on vertical surfaces.

8. Remove roof top power ventilators, extend top of curb to minimum 12 inches above roofline. Extend flashing over top of curb. Reset equipment.

9. Provide termination strip and continuous bead of sealant under counter flashing.

10. Straight run wall and curb flashings shall be flashed with EPDM membrane. **Note: All flashings are to extend a minimum height of 8" (200mm) above the roof level.**

11. On all re-roofing applications, loose flashing materials must be removed down to a sound substrate and replaced with new flashing. To ensure proper drainage of the existing structure, weep holes must never be covered by new flashings.

12. Terminations utilizing aluminum compression bars are surface-mounted counter-flashings must be secured directly to a smooth and sealed wall surface.

13. EPDM wall flashings terminated with metal copings must be fully extended under the coping and mechanically fastened to a minimum 1 ½" (40mm) down the face of the wall.

14. EPDM Flashing Membrane shall be adhered to substrate using EPDM bonding cement. Follow the EPDM adhered instructions for correct application of this cement. The flashing membrane shall be rolled carefully into the substrate. Care must be taken to ensure that the flashing does not bridge at any change of direction, such as from the base of a parapet wall to the roof deck.

3.16 INSTALLING ROOF EDGING SYSTEM

A. Inspection: Verify that the roof edging installation will not disrupt other trades. Verify that the substrate is dry, clean and free of foreign matter. Report and correct any defects prior to any installations.

B. Installation of Roof Edging System: Submit product design drawings for review and approval to the Architect before fabrication.

C. The Contractor is fully responsible to check all as-built conditions and verify the manufacturer's roof edge details for accuracy to fit the wall assembly prior to fabrication. **Contractor's Note: Submitted roof edge details will accurately depict existing conditions and will be supplied to resolve existing conditions at no additional cost to the Owner**.

D. Comply with the roof edging manufacturer's installation guide when setting the roof edging.

E. Use provided fasteners consistent with the manufacturer's instructions, suitable for the substrate to which it is being installed.

F. Install water cut-off, as recommended by the membrane manufacturer, under the anchor bar.

G. Roof Edge Flashing Strips: Install all flashing strips in longest lengths possible to minimize laps under the anchor bar. Following the manufacturer's application method for flashing, install the strips:

1. Minimum 8 inches into the field of the roof;
2. Down the outside face of the wall, ½ inch past wood nailers.

H. Miter & Scupper Bar: Remove all dirt, dust and debris from the anchor bar. Apply a 3-inch wide and ¼-inch thick band of mastic to the back of the anchor bar.

I. Splice Plates: Apply a 3/8 inch bead of non-curing sealant to both sides of the spacer and on the deck flange.

J. Anchor Bar: Position 12-foot long sections of anchor bar with applied mastic overlapping splice plate and butting securely to the EPDM gasket.

1. Allow ½ inch space between anchor bars.
2. Install splice plate at opposite end of 12-foot long anchor bar.

Fasten anchor bar at 12 inches on center intervals through. Use 2” stainless steel fasteners as provided by the manufacturer. Field cut sections as necessary.

K. Fascia Panels: Install panels left to right. Position 12’ fascia panels on top of the anchor bar. Overlap preceding panel by 1 inch at notches provided. With panels in correct position, snap each section into anchor panel.

3.17 WALKWAY PADS

A. Provide manufacturer’s standard EPDM walkway pad under each ladder, roof hatch, completely around each HVAC unit, and to any other areas designated on the drawings. Install in accordance with manufacturer’s requirements with lap cement or seam tape.

3.18 EXPANSION JOINT

A. Install a new expansion joint cover, curb to wall, curbed formed as per the manufacturers’ specifications.

3.19 WATERSTOPS

A. Install temporary cutoffs around incomplete edges of roofing assembly at the end of each workday and when work must be postponed due to inclement weather. Straighten the insulation line using loosely laid pieces of insulation. Seal the EPDM membrane to the deck or existing membrane by performing the following procedure: Fold the edge of the roofing membrane back a minimum of 12” (300mm). Clean the surface of the folded-back membrane with EPDM Primer or other approved cleaning method. Apply a ¼” (8mm) bead of Lap Caulk or Pourable Sealer on the cleaned area of the sheet. If the roofing membrane installation is to be delayed for 14 days or more, of if the substrate surface is rough, apply two ¼” (8mm) beads of sealant. Remove the temporary seams completely when work resumes, cutting out the contaminated membrane. Remove all sealant, contaminated membrane, insulation fillers, etc. from the work area and properly dispose off-site.

3.20 ROOF DRAINS

1. New Roofs:

    a. Set drain flange tight to roof deck.

    b. Secure roof drain to roof deck with approved under deck clamp bolted to underside of drain body.

    c. Insulate roof drain sump and horizontal piping.

    d. Coordinate with types, locations, and quantities as indicated on plans.

2. Existing Roofs:

    a. The Contractor shall remove the existing Roof Drain Dome Strainers and Flashing Clamp Rings and discard.

    b. Clean and prep remaining drain bowl assembly for new roofing.

    c. Contractor to Install New Cast Iron Dome Strainers, Flashing Clamp rings and 2” Cast Iron Static Extension Ring, replace all missing or damaged components with new to match as manufactured by Zurn, or approved equal by Architect.

3. Provide a smooth transition from drain bowl to deck surface.

a. Taper insulation back from drain a minimum of 24” to provide for positive drainage.

b. Prime all metal surfaces.

4. Install EPDM membrane at drain bowl.

a. Proceed with installations only after unsatisfactory conditions have been corrected.

b. Extend membrane 1" beyond the inside edge of the drain bowl.

c. Position membrane so as to avoid the occurrence of any seams at drains.

5. Install clamping ring and drain covers supplied with drain.

6. Test all drains for proper flow and water tightness. Correct defects.

3.21 VENT STACKS AND PENETRATIONS

A. Use pre-molded pipe boot for vent stacks.

B. Use peel and stick pipe boots for all hot pipe penetrations.

C. Use roof penetration pocket flashing with nailer and pourable sealer for all angles and unusual penetrations.

3.22 INSPECTIONS

A. After all roofing system work is completed, provide an inspection by the roofing system manufacturer’s representative. Representative must be employed expressly as a technical employee and not concurrently in a sales role. Provide, via the representative, documentation verifying that roofing system has been installed according to the Specifications.

B. All work shall also be subject to inspection by Architect and Owner. Work found to be in violation of specifications or not in accordance with established workmanship; practices and standards will be subject to complete removal and proper replacement with new materials at contractor’s expense.

3.23 CLEANING

A. Clean up and remove daily from the site all wrappings, empty containers, paper, loose particles, and other debris resulting from these operations.

B. Remove markings from finished surfaces. Restore all other building surfaces and areas affected by the roofing application to the same conditions of aforementioned on day of job start.

C. Repair or replace defaced or disfigured finishes caused by work of this section.

D. Keep newly installed roofing membrane clean and new in appearance under the assumption that all areas of roofing are aesthetically essential. Contractor may be directed to remedy – and if no remedy available – replace, newly roofed areas that are not maintained as such during the balance of installation.

3.24 PROTECTION

A. Provide traffic ways, erect barriers, temporary interior partitions and enclosures, fences, guards, rails, enclosures, chutes, and the like to protect personnel, roofs, and structures, vehicles and utilities.

B. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8" thick.

C. In addition to the plywood listed above, an underlayment of minimum 1/2-inch recovery board is required on new roofing.

1. Special permission must be obtained from the manufacturer before any traffic will be permitted over new roofing.

3.25 FIELD CONTROL

A. Field inspection will be performed as outlined under 1.12 of this section.

3.26 TESTING OF COMPLETED ROOF SYSTEM

A. Schedule flooding of roofs with the Owner. No flood testing will be allowed when buildings are occupied. Flood each area of roofing membrane with no less than a 2” depth of water. Include all areas sloped not over ¼” per foot. Provide temporary dams where required. Leave in place 24 hours and examine substructure for evidence of leakage. Repair leaks and retest as before, until no leakage is observed.

3.27 POSITIVE DRAINAGE

A. The General Construction Contractor or the roofing contractor (if separate prime contract) shall be responsible for installing the roof slope and drainage in accordance with N.R.C.A. standards. Additionally, the Contractor shall be responsible for the installation of structural steel, roof decking, roof drains, tapered insulation, perlite, crickets, roof plies, etc. in accordance with and to the tolerances indicated in the contract documents. **There should be no standing water on any portion of the entire roof surface 48 hours after a rainfall, during ambient drying conditions.**

B. The roof manufacturer’s representative shall witness the conducting of the positive drainage exercise, and sign-off on same.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 076000 – FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide and install new cap, counterflashing, wall and base flashing as required for proper installation, as shown on drawings and specified herein.

B. Related Sections include the following:

1. Section 033000 – Cast-in-Place Concrete - for concrete fill and reinforcing steel.
2. Section 042000 – Unit Masonry - for work adjacent to work of this Section.
3. Section 051200 – Structural Steel Framing - for work adjacent to work of this Section.
4. Section 053000 – Metal Decking - for work adjacent to work of this Section.

1.02 DELIVERY AND STORAGE

A. Delivered materials shall be in the manufacturer's original packages and containers, clearly marked with the approved manufacturer's name and trademark for every item.

B. Store all materials in a dry, ventilated place off the ground. During adverse weather conditions and job delays, store materials under cover or in a totally enclosed space. Use of wet materials will not be permitted.

1.03 PREPARATION

A. Wood blocking and nailers for flashing cleats shall have been rigidly anchored in place.

B. Dissimilar materials in contact shall be fully isolated from each other. Unprimed, abraded, or otherwise corrosive surfaces of metal shall receive a coat of the bituminous paint, and allow to dry before assembling.

1.04 SUBMITTALS

A. Comply with requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Submit manufacturer's product specifications, installation instructions, and general recommendations for each specified sheet metal material and fabricated product.

C. Samples:

1. Submit two 8" square samples of specified sheet materials to be exposed as finished surfaces.

2. Submit two 12" long completely finished units of specified fabricated products exposed as finished work.

D. Shop Drawings:

1. Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including major counter flashings, trim/fascia units.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aluminum: ASTM B209, .032" thick aluminum alloy 3003-H14.

B. Copper: ASTM B370, 16 oz. and 20 oz. soft temper. Copper exposed to weather shall be lead coated as per ASTM B101. Class "A".

C. Solder: As recommended by the copper manufacturer. Conform to ASTM B32 - min. tin content for lead coated copper 60 percent.

D. Stainless Steel: Sheets or strips - ASTM A240 or ASTM A666, Type 302 or 304 gauge. .015 inch - 8-to-10-foot lengths. Finish - 2D. Solder - ASTM B32 - 60-40% block tin and piglead. Flux - Acid type. Sealant - single component synthetic rubber - color as selected by Architect.

E. Nails: For copper work, 3/8" diameter head, solid copper.

F. Pop Rivets: Noncorrosive metal, may be used where watertightness of fastener is not a factor or if waterproof rivets are used.

G. Standard of Workmanship: Methods of forming and joining copper shall be as specified and detailed in the booklet "Copper and Common Sense", published by Revere Copper and Brass Incorporated, except as modified herein and suggested guide specifications for "Stainless Steel Roofing and Flashing" published by International Nickel Company, Inc.

H. Pipe Flashing: Flashing around pipes and vents extending above the roof shall consist of copper stainless zinc tubes of proper diameter, extending at least 12" above the finished roof surface, and extending at least 6" beyond opening.

I. Mechanical Equipment Flashing: Examine plans and specifications for mechanical and electrical trades and note extent of flashing covered herein. Provide all flashing in addition thereto as necessary.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The installer shall examine the substrate and the conditions under which flashing work is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 PREPARATION

A. Coordination:

1. Coordinate flashing work with other work for correct sequencing of items making up entire system of waterproofing and rain drainage.

2. Do not proceed with the installation of flashing work until curb and substrate construction, cant strips, blocking, reglets, and other construction to receive the work are complete.

3.03 INSTALLATION

A. Comply with manufacturer's instructions for handling and installation of flashing work.

1. Unless otherwise recommended by manufacturer, comply with recommendations of NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" for items shown on drawings.

2. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook" Conform to dimensions and profiles shown unless more stringent requirements are noted on the drawings.

3. Comply with details and profiles shown on drawings.

B. For non-moving seams, provide soldered flat lock seams, except as otherwise indicated. Comply with metal producer's recommendations for tinning, soldering, and cleaning the joints.

1. Flashing and trim: 10'-0" maximum spacing, and 2'-0" from corners and intersections.

2. Conceal fasteners and expansion provisions wherever possible. Fold back edges on concealed side of exposed edges to form a hem.

3. Insert flashings into reglets where shown. Anchor by mechanical means, including driven wedges of lead or other compatible metal, space 2'-0". Seal the joint with sealant as indicated.

4. Separate copper work from dissimilar metals by a 15 mil dry film thickness bituminous coating or by a heavy tinning of solder at spot contacts.

5. Fabricate, support, and anchor rain drainage in a manner which will withstand thermal expansion stresses and full loading by water or ice, without damage, deterioration, or leakage.

6. On bituminous membranes, provide not less than 4" embedment of flashing in membrane, and cover edge with tape or stripping set in roofing cement.

3.04 MISCELLANEOUS WORK AND CLEANING

A. Do all necessary cutting, patching fitting in connection with the flashing work required to coordinate this work with that of other trades.

B. On completion, flashing work shall be left in perfect condition. Neutralize excess flux which may cause acid stains in washing soda.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 078413 – PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested firestop systems shall be used in specific locations as follows:

B. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

C. Blank openings through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

D. Openings and penetrations in fire-rated partitions or walls containing fire doors.

E. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 033000 - Cast-In-Place Concrete
2. Section 042000 - Unit Masonry
3. Section 078443 - Joint Firestopping
4. Section 079200 - Joint Sealants
5. Section 092900 - Gypsum Wall Board
6. Section 210000 - Fire Suppression
7. Section 220000 - Plumbing
8. Section 230000 - Heating, Ventilating, and Air Conditioning
9. Section 260000 - Electrical

1.05 REFERENCES

A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Test Requirements: UL 1479, “Fire Tests of Through-Penetration Firestops”

C. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:
   a. Firestop Devices (XHJI)
   b. Fire Resistance Ratings (BXRH)
   c. Through-Penetration Firestop Systems (XHEZ)
   d. Fill, Voids, or Cavity Material (XHHW)
   e. Forming Materials (XHKU)

D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

E. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.

F. Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops.”

G. Building Code of New York State.

H. NFPA 101 - Life Safety Code

I. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems that comply with specified requirements of tested systems.

B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified firestop systems to be used and manufacturer's installation instructions to comply with Section 013300.

B. Manufacturer's engineering judgment identification number and drawing details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor’s name who will install firestop system as described in document.

C. Submit safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

B. The work is to be installed by a contractor with at least one of the following qualifications:

1. FM 4991 Approved Contractor
2. UL Approved Contractor
3. Hilti Accredited Fire Stop Specialty Contractor

C. Firm with not less than 3 years experience with fire stop installation.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING - GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service

and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of zero (0) as determined by ASTM G21.

G. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturer as identified below:

B. Basis of Design: Hilti, Inc., Plano, Texas, 800-879-8000, www.us.hilti.com.

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Pre-formed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors the following products are acceptable:

1. Hilti Cast-In Place Firestop Device (CP 680-P)
   a. Add Aerator Adaptor when used in conjunction with aerator system.
2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
3. Hilti Cast-in Place Firestop System for Metal Decks (CFS CID MD P) including all components as described by manufacturer for proper installation.

4. Hilti Cast-in Place Firestop System for Metal Decks (CFS CID MD M) including all components as described by manufacturer for proper installation, for use with noncombustible penetrants.
5. Hilti Tub Box Kit (CP 681) for use with tub installations.
6. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.
7. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
8. Hilti Firestop Block (CFS-BL)
9. Hilti Closet Stub (CFS-CID CS)

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
2. Hilti Fire Foam (CP 620)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti Silicone Sealant Gun Grade (CFS-S SIL GG)
2. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

E. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

F. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
2. Hilti Fire Foam (CP 620)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

G. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Firestop Putty Stick (CP 618)
2. Hilti Firestop Plug (CFS-PL)

H. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti Firestop Putty Pad (CFS-P PA)
2. Hilti Firestop Putty Pad (CP 617)
3. Hilti Firestop Box Insert

I. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti Firestop Collar (CP 643N)
2. Hilti Firestop Collar (CP 644)
3. Hilti Wrap Strips (CP 648-E/648-S)

J. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Composite Sheet (CFS-COS)
3. Hilti Firestop Mortar (CP 637)
4. Hilti Fire Foam (CP 620)
5. Hilti Firestop Board (CP 675T)

K. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Firestop Board (CP 675T)

L. Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:

1. Hilti Firestop Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
2. Hilti Firestop Cable Collar (CFS-CC)
3. Hilti Firestop Sleeve (CFS-SL SK)
4. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
5. Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
6. Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.

M. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits or cables is expected, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Firestop Plug (CFS-PL)

N. For single or cable bundles up to one inch diameter penetrating gypsum, masonry, concrete walls or wood floor assemblies the following product is acceptable:

1. Hilti Firestop Cable Disc (CFS-D)

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector, per requirements of Section 109, International Building Code 2000, ed.

3.03 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

E. Manufacturer’s Field Services: Contractor to ensure a manufacturer’s direct representative is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper

selection and installation procedures. Training will be done per manufacturer's written recommendations published in their literature and drawing details. During installation, contractor shall have manufacturer's representative provide periodic visual observations and written documentation of the results. Contact Hilti for support at 800.879.8000.

3.05 IDENTIFICATION & DOCUMENTATION

A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.

1. A.1 The Documentation Form for through penetrations is to include:
2. A Sequential Location Number
3. The Project Name
4. Date of Installation
5. Detailed Description of the Penetration's Location
6. Tested System or Engineered Judgment Number
7. Type of Assembly Penetrated
8. A Detailed Description of the Size and Type of Penetrating Item
9. Size of Opening
10. Number of Sides of Assemblies Addressed
11. Hourly Rating to be Achieved
12. Installer's Name

B. Copies of these documents are to be provided to the general contractor at the completion of the project.

C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning: Through Penetration Firestop System – Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:

E. Create multiple projects/ facilities, add/create/ remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.

F. Define data to track using pre-defined input fields or creating custom input fields as desired.

G. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.

H. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.

I. Annotate (mark) location of penetration on 2D floor plan.

J. Create reports by filtering data and utilizing report templates.

K. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application and cloud-based system.

L. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.

Permanently attach Hilti identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes.

Acceptable Software: Hilti CFS-DM, from Hilti Inc., Tulsa, OK. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: www.us.hilti.com or www.hilti.ca.com

M. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

3.06 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

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3.07 SCHEDULE OF THROUGH PENETRATION FIRESTOP SYSTEMS

CONCRETE FLOORS			CONCRETE OR BLOCK WALLS		
TYPE OF PENETRANT	**F-RATING (HR)**	**BASIS OF DESIGN UL SYSTEM**	**TYPE OF PENETRANT**	**F-RATING (HR)**	**BASIS OF DESIGN UL SYSTEM**
CIRCULAR BLANK OPENINGS	1	F-A-0006, C-AJ-0055, C-AJ-0090	CIRCULAR BLANK OPENINGS	1	C-AJ-0055, C-AJ-0090
	2	F-A-0006, C-AJ-0055, C-AJ-0090		2	C-AJ-0055, C-AJ-0090
	3	F-A-0006, C-AJ-0055, C-AJ-0086,		3	C-AJ-0055, C-AJ-0086
SINGLE METAL PIPES OR CONDUIT	1	C-AJ-1226, F-A-1028, F-A-1017	SINGLE METAL PIPES OR CONDUIT	1	C-AJ-1226, W-J-1067, W-J-1020
	2	C-AJ-1226, F-A-1028, F-A-1017		2	C-AJ-1226, W-J-1067, W-J-1020, W-J-1248
	3	C-AJ-1226, F-A-1017		3	C-AJ-1226, W-J-1041, W-J-1068
	4	C-BJ -1037, C-BJ-1034		4	C-BJ-1034, C-BJ-1037, W-J-1041, W-J-1042, W-J-1068
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT)	1	F-A-2053, F-A-2025, C-AJ-2109, C-AJ-2098, C-AJ-2271, C-AJ-2167,	SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT)	1	C-AJ-2109, C-AJ-2098, C-AJ-2167, C-AJ-2371, C-AJ-2342
	2	C-AJ-2098, C-AJ-2271, C-AJ-2167, C-BJ-2021, C-AJ-2371, C-AJ-2342		2	C-AJ-2109, C-AJ-2098, C-AJ-2167, C-AJ-2371, C-AJ-2342
	3	F-A-2054, C-AJ-2109, C-AJ-2098, C-AJ-2371, C-AJ-2342		3	C-AJ-2109, C-AJ-2098, C-AJ-2371, C-AJ-2342
	4	C-BJ 2016, C-AJ-2017		4	W-J-2057, W-J-2091
SINGLE/CABLE BUNDLES	1	F-A-3007,C-AJ-3095,C-AJ-3180, C-AJ-3283	SINGLE/CABLE BUNDLES	1	W-J-3036, C-AJ-3095, C-AJ-3180, W-J-3060, W-J-3167
	2	F-A-3007,C-AJ-3095,C-AJ-3334, F-A-3060		2	W-J-3036, C-AJ-3095, C-AJ-3180, W-J-3060, W-J-3167, W-J-3189
	3	F-A-3007, C-AJ 3095, C-AJ-3285		3	C-AJ-3095, C-AJ-3180, W-J-3167
				4	W-J-3050
CABLE TRAY	1	C-AJ-4034, C-AJ-4035	CABLE TRAY	1	W-J-4027, C-AJ-4034, C-AJ-4035
	2	C-AJ-4034, C-AJ-4035		2	W-J-4027, C-AJ-4034, C-AJ-4035
	3	C-AJ-4034, C-AJ-4035		3	C-AJ-4034, C-AJ-4035
				4	W-J-8007
SINGLE INSULATED PIPES	1	F-A 5015, F-A 5017, C-AJ-5090, C-AJ-5091, C-AJ-5090, C-AJ-5048	SINGLE INSULATED PIPES	1	C-AJ-5090, C-AJ-5091, C-AJ 5061, W-J-5042
	2	F-A 5015, F-A 5017, C-AJ-5090, C-AJ-5091, C-AJ-5090		2	C-AJ-5090, C-AJ-5091, C-AJ-5061, W-J-5042
	3	F-A 5016, C-AJ-5090, F-A-5018		3	C-AJ-5090, C-AJ-5061
	4	C-BJ-5006		4	C-BJ-5006, W-J-5028
ELECTRICAL BUSWAY	1	C-AJ-6006, C-AJ-6017, F-A-6002, C-AJ-6036	ELECTRICAL BUSWAY	1	C-AJ-6006, C-AJ-6017, C-AJ-6036
	2	C-AJ-6006, C-AJ-6017, F-A 6042, C-AJ-6036		2	C-AJ-6006, C-AJ-6017, C-AJ-6036
	3	C-AJ-6006, C-AJ-6017		3	C-AJ-6006, C-AJ-6017
MECHANICAL DUCTWORK WITHOUT DAMPERS NON-INSULATED	1	C-AJ-7046, C-AJ-7051, C-AJ-7084	MECHANICAL DUCTWORK WITHOUT DAMPERS NON-INSULATED	1	C-AJ-7046, C-AJ-7051, W-J-7021, W-J-7022
	2	C-AJ-7046, C-AJ-7051, C-AJ-7085		2	C-AJ-7046, C-AJ-7051, W-J-7021, W-J-7022
	3	C-AJ-7046, C-AJ-7051		3	C-AJ-7046, C-AJ-7051
MECHANICAL DUCTWORK WITHOUT DAMPERS INSULATED	N/A**	N/A**	MECHANICAL DUCTWORK WITHOUT DAMPERS INSULATED	1	W-J-7029, W-J-7124
				2	W-J-7091, W-J-7112, W-J-7124
MIXED PENETRANTS	1	C-AJ 8099, C-AJ-8056, C-AJ-8143	MIXED PENETRANTS	1	C-AJ 8099, C-AJ 8056, W-J 8007, C-AJ 8143
	2	C-AJ-8099, C-AJ-8056, C-AJ-8143		2	C-AJ 8099, C-AJ 8056, W-J 8007, C-AJ 8143
	3	C-AJ-8099, C-AJ-8056		3	C-AJ 8041, C-AJ 8056, W-J 8007, C-AJ 8099
	4	C-AJ-8095		4	C-AJ 8095, W-J 8007
WOOD FLOORS			**GYPSUM WALLS**		
TYPE OF PENETRANT	**F-RATING (HR)**	**BASIS OF DESIGN UL SYSTEM**	**TYPE OF PENETRANT**	**F-RATING (HR)**	**BASIS OF DESIGN UL SYSTEM**
METAL PIPES OR CONDUIT	1	F-C-1009, F-C-1059, F-C-1168	METAL PIPES OR CONDUIT	1	W-L-1054, W-L-1058, W-L-1164, W-L-1506
	2	F-C-1009, F-C-1059, F-C-1168		2	W-L-1054, W-L-1058, W-L-1164, W-L-1506
				4	W-L-1110, W-L-1111, W-L-1165
NON-METALLIC PIPE OR CONDUIT	1	F-C-2232, F-C-2030, F-C-2160, F-C-2389	NON-METALLIC PIPE OR CONDUIT	1	W-L-2078, W-L-2075, W-L-2128
	2	F-C-2029, F-C-2030, F-C-2128, F-C-2160		2	W-L-2078, W-L-2075, W-L-2128
				4	W-L-2184, W-L-2245
SINGLE OR BUNDLED CABLES	1	F-C-3012, F-C-3110, F-C-3044	SINGLE OR BUNDLED CABLES	1	W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396
	2	F-C-3012, F-C-3110		2	W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396
				3	W-L-3385, W-L-3277
				4	W-L-3139, W-L-3334
INSULATED PIPES	1	F-C-5004, F-C-5037, F-C-5036	CABLE TRAY	1	W-L-4011, W-L-4019, W-L-4081
				2	W-L-4011, W-L-4019, W-L-4081
				4	W-L 8014
	2	F-C-5004, F-C-5037	INSULATED PIPES	1	W-L-5028, W-L-5029, W-L-5047
				2	W-L-5028, W-L-5029, W-L-5047
				4	W-L-5073
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	F-C-7013	NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	W-L 7017, W-L-7040, W-L-7042, W-L-7155
				2	W-L-7040, W-L-7042, W-L-7155
INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	N/A**	INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	W-L-7059, W-L-7153, W-L-7156, W-L-7151
	2	N/A**		2	W-L-7059, W-L-7153, W-L-7156, W-L-7151
MIXED PENETRANTS	1	F-C-8009, F-C-8014, F-C-8026	MIXED PENETRANTS	1	W-L-1095, W-L-8013
				2	W-L-1095, W-L-8013
				4	W-L-8014

COMPOSITE METALDECK FLOORS			
TYPE OF PENETRANT	**FLOOR COVERAGE**	**F-RATING (HR)**	**BASIS OF DESIGN UL SYSTEM**
CIRCULAR BLANK OPENINGS	2-1/2”	2	F-A-0040
	4-1/2”	2	F-A-0040, F-A-0041
SINGLE METALLIC PIPE OR CONDUIT (STEEL, IRON, COPPER)	2-1/2”	2	F-A-1192, F-A-1193
	4-1/2”	3	F-A-1192, F-A-1193
	4-1/2”	2	F-A-1194
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT)	2-1/2’	2	F-A-2310, FA-2311
	4-1/2”	2	F-A-2313, F-A-2314, F-A-2315, F-A-2316
	4-1/2”	3	F-A-2310, FA-2311, F-A-2312
SINGLE/CABLE BUNDLES	2-1/2”	3	F-A-3071, F-A-3072
SINGLE INSULATED PIPES	2-1/2”	2	F-A-5069, F-A-5070, F-A-5071
	4-1/2”	3	F-A-5069, F-A-5070, F-A-5071
MIXED PENETRANTS	4-1/2”	3	F-A-8055

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 078443 – JOINT FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested and listed firestop systems shall be used in specific locations as follows:

1. Safing slot gaps between edge of floor slabs and perimeter curtain walls.
2. Openings between structurally separate sections of wall or floors.
3. Gaps between the top of walls and ceilings or roof assemblies.
4. Expansion joints in walls and floors.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 033000 - Cast-In-Place Concrete
2. Section 042000 - Unit Masonry
3. Section 078413 - Penetration Firestopping
4. Section 079200 - Joint Sealants
5. Section 092900 - Gypsum Wall Board

1.05 REFERENCES

A. Underwriters Laboratories, Inc. (UL) Fire Resistance Directory, Volume II, updated annually:

1. Joint Systems (XHBN)
2. Perimeter Fire Containment Systems (XHDG)
3. Fire Resistance Ratings (BXRH)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

B. Omega Point Laboratories, Inc. (OPL) Listed Products Directory, Volume II, updated annually:

1. Fire Resistant Joint Systems

C. ASTM E 1966, “Standard Test Method for Fire-Resistive Joint Systems”

D. ASTM E 1399, “Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Width of Architectural Joint Systems”

E. ASTM E 84, “Standard Test Method for Surface Burning Characteristics of Building Materials”

F. ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops”

G. ASTM E 2307, “Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus”

H. ANSI/UL 2079, “Tests for Fire Resistance of Building Joint Systems”

I. ASTM D6904, “Standard Practice for Resistance to Wind-Driven Rain”

J. International Firestop Council Recommended (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments

K. Building Code of New York State

L. NFPA 101 - Life Safety Code

M. ASTM C679, “Standard Test Method for Tack-Free Time of Elastomeric Sealants”

1.06 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation shall meet requirements of ASTM E 1966 and/or ANSI/UL 2079 tested and listed assemblies that provide fire-resistance ratings not less than that of the construction in which the joint occurs.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no tested and listed system is available through a manufacturer, an engineering judgment derived from similar tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents shall follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of tested firestop systems to be used and manufacturer's installation instructions to comply with Section 013300.

B. Manufacturer's engineering judgment identification number and details when no tested and listed system is available for an application. Engineering judgment shall include both project name and contractor’s name who will install firestop system as described in document.

C. Submit safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

B. The work is to be installed by a contractor with at least one of the following qualifications:

1. FM 4991 Approved Contractor
2. UL Approved Contractor
3. Hilti Accredited Fire Stop Specialty Contractor

C. Installer shall have not less than 3 years experience with fire stop installation.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL or OPL label, where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

F. Comply with ASTM D 6905 (modified) for resistance to wind driven rain and water.

PART 2 - PRODUCTS

2.01 JOINT FIRESTOPPING - GENERAL

A. Provide firestopping composed of components that are compatible with each other and substrates forming joints under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each fire-resistive joint system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Joints in or between Fire Rated Construction: Provide joint firestopping systems with ratings determined per UL 2079 or ASTM E 1966:

D. F-Rating: not less than the fire resistance rating of the construction they will join.

E. Firestop Top Track Seal: For metal stud partitions installed on flat concrete slab use one-piece, pre-formed, polyurethane foam based, firestop seal for use with standard head-joint top tracks and bottom-joint tracks, and slip-type head joints in fire-rated construction at top or bottom of partition to maintain continuity of the fire-resistance-rated assembly indicated. Provide in width and configuration required to accommodate depth and installation of studs and designed to saddle-over the top track or under the bottom-track.

F. Joints at Exterior Curtain Wall / Floor Intersections: Provide joint firestopping systems with ratings determined per ASTM E 2307:

G. F-Rating: not less than the fire resistance rating of the construction they will join.

H. For edge of slab conditions with a full height vision glass, or for conditions which do not contain an insulated spandrel at the floor line, only tested system HI/BPF 120-11 issued by Intertek Laboratories shall be used. If the tested system does not meet the project conditions, an engineering judgment derived from HI/BPF 120-11 shall be submitted to local authorities having jurisdiction for their review and approval prior to installation.

I. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079:

J. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

K. Joints at Intersection between Rated Wall Assemblies and Nonrated Horizontal Assemblies: Provide joint firestopping systems with ratings determined by ASTM E 2837.

L. Mold Resistance: Provide joint firestopping system sealant with mold and mildew resistance rating of one (1) or less as determined by ASTM G21.

M. Rain and water resistance: provide perimeter joint sealant tested in accordance with ASTM D 6904 with less than 1 hour tack free time as tested in accordance with ASTM C 679.

2.02 MANUFACTURERS

A. Subject to compliance with joint systems (XHBN) listed in Volume II of the UL Fire Resistance Directory or OPL Listed Products Directory; provide products of the following manufacturer as identified below:

B. Basis of Design: Hilti, Inc., Plano, Texas, 800-879-8000, www.us.hilti.com.

2.03 MATERIALS

A. Use only firestop products that have been tested in accordance with ASTM E 1966 and/or ANSI/UL 2079 for specific rated construction conditions conforming to construction assembly type, movement capability, spacing requirements, and fire-resistance-rating involved for each separate instance.

B. Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti Firestop Top Track Seal (CFS-TTS)
2. Hilti Firestop Joint Spray (CFS-SP WB)
3. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
4. Hilti Flexible Firestop Sealant (CP 606)
5. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
6. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
7. Hilti bottom of wall sealant CP 605

C. Sealants for use as part of a Perimeter Fire Barrier System between fire-resistance-rated floors and exterior wall assemblies, the following products are acceptable:

1. Hilti Firestop Joint Spray (CFS-SP WB)
2. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
3. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
4. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

D. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal deck profile; use as a backer for spray material.

1. Hilti Speed Plugs (CP 777)
2. Hilti Speed Strips (CP 767)

E. Provide a firestop system with an Assembly Rating as determined by ASTM E 1966 and/or ANSI/UL 2079 which is equal to the fire-resistance ratings of the construction in which the joint occurs.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
2. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
3. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
4. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Listed Products Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of construction joint materials.

1. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed joints to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities and/or independent inspection agency.

C. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

D. Manufacturer’s Field Services: Contractor to ensure a manufacturer’s direct representative is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. Training will be done per manufacturer’s written recommendations published in their literature and drawing details. During installation, contractor shall have manufacturer’s representative provide periodic visual observations and written documentation of the results. Contact Hilti for support at 800.879.8000.

3.05 IDENTIFICATION & DOCUMENTATION

A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.

B. The Documentation Form for Construction Joints is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the Construction Joints location
5. Tested System or Engineered Judgment Number
6. Type of Construction Joint
7. The Width of the Joint
8. The Lineal Footage of the Joint
9. Number of sides addressed
10. Hourly rating to be achieved
11. Installers Name

C. Copies of these documents are to be provided to the general contractor at the completion of the project.

D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:

1. Create multiple projects/ facilities, add/create/ remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.

2. Define data to track using pre-defined input fields or creating custom input fields as desired.

3. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.

4. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.

5. Annotate (mark) location of penetration on 2D floor plan.

6. Create reports by filtering data and utilizing report templates.

7. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application and cloud-based system.

8. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.

   Permanently attach Hilti identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes. Acceptable Software: Hilti CFS-DM, from Hilti Inc., Plano, TX. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: www.us.hilti.com or www.hilti.ca.com

E. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

3.06 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

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3.08 SCHEDULE OF MOST COMMON JOINT FIRESTOP SYSTEMS

Joint Type	F-Rating (Hr)	Hilti Basis of Design UL System	
		Joint Width Less than or Equal to 2”	Joint Width Greater than 2” Less than or Equal to 6” [4]
Concrete (**Floor to Floor**)	1	FF-D-1012, FF-D-1013[1]	FF-D-1012, FF-D-1013
	2	FF-D-1012, FF-D-1013[1]	FF-D-1012, FF-D-1013
	3	FF-D-1011, FF-D-1026[1]	FF-D-1011, FF-D-1026
	4	FF-D-1047	FF-D-1125
Concrete (**Edge of Floor Slab to Wall)**	1	FW-D-1011, FW-D-1012, FW-D-1013	FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021
	2	FW-D-1011, FW-D-1012, FW-D-1013	FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021
	3	FW-D-1011	FW-D-1011, FW-D-1021
	4	FW-D-1047	FW-D-1092
Concrete or Block Wall to Flat Concrete Floor (**Top-of-Wall**)	1	N/A**	N/A**
	2	HW-D-0097[1]	HW-D-1009
	3	HW-D-1008[1], HW-D 0268	HW-D-1008
	4	HW-D-1042	HW-D-1103
Concrete or Block Wall to Concrete Over Fluted Metal Deck (**Top-of-Wall)**	1	HW-D-0098	N/A**
	2	HW-D-0080, HW-D-0081, HW-D-0098	HW-D-1037
	3	N/A**	N/A**
	4	HW-D-0294	N/A**
Gypsum Wall to Flat Concrete Floor (**Top-of-Wall)**	1	HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
	2	HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
	3	HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
Gypsum Shaft Wall to (**Top-of-Wall)**	2	HW-D-0342 (FLAT CONCRETE) HW-D-0541, HW-D-0542 (CONCRETE OVER METAL DECK)	N/A**
Gypsum Shaft Wall to Concrete Floor (**Bottom-of-Wall)**	1	BW-S-0023	N/A**
	2	BW-S-0023	N/A**
Gypsum Wall to Concrete Floor (**Bottom-of-Wall)**	1	BW-S-0001, BW-S-0002, BW-S-0039	N/A**
	2	BW-S-0001, BW-S-0002, BW-S-0039	N/A**
Gypsum Wall to Concrete Over Fluted Metal Deck (**Top-of-Wall)**	1	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-0292, HW-D-0295, HW-D-538*	HWD-1011, HWD-1012, HW-1020
	2	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-292, HW-D-0295, HW-D0538*	HW-D-1011, HW-D-1012, HW-D-1020
	3	HW-D-0292, HW-D-0295	HWD-1011, HWD-1012, HW-1020
	4	HW-D-0292, HW-D-0295	N/A**
Concrete (**Wall to Wall**)	2	WW-D-0017, WW-D-0082	WW-D-1080, WW-D-1084
	3	WW-D-1011[1], WW-D-0032	WW-D-1011
	4	WW-D-1047	WW-D-1128
Gypsum to Concrete (**Wall to Wall)**	1	WW-D-0040	N/A**
	2	WW-D-0040	N/A**

* SEE NOTE 3 ** CONTACT HILTI FOR CURRENT UL-CLASSIFIED SYSTEM OR ENGINEER JUDGMENT DRAWING: 800-879-8000

NOTES:

1. CLASSIFIED SYSTEMS FOR 2" - 6" WIDE JOINTS MAY BE USED FOR JOINTS 2" WIDE AND LESS.
2. CONFIRM THAT MOVEMENT CAPABILITIES OF THE SELECTED UL SYSTEM MEETS OR EXCEEDS THE SPECIFIED MOVEMENT RANGE OF THE PARTICULAR JOINT.
3. SYSTEMS MARKED WITH ASTERIK (*) ARE SUITABLE FOR TOP-OF-WALL JOINTS WHERE THE FLUTED METAL DECK HAS SPRAY-ON MONOKOTE MK-6/HY FIREPROOFING.
4. VERIFY ALLOWABLE JOINT WIDTH ON SPECIFIC UL SYSTEM DRAWING.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 079100 – EXTERIOR WALL JOINT SEALS (EMSEAL)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preformed, precompressed, expanding foam joint seals for expansion joints in exterior walls.

B. Related Sections:

1. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

2. Section 079200 – Joint Sealants

1.02 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Convene at Project site 1 week prior to beginning work of this Section.

2. Attendance: Architect, Contractor, Construction Manager, joint seal installer and related trades.

3. Review and discuss:

a. Joint seal manufacturer's requirements, project conditions, allowable structural movement at joints, and protection of completed work.

b. Transitions in plane and direction, and requirement for continuity of seal through watertight transitions from wall expansion joint to other interfacing expansion joint systems at adjacent construction.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Indicate joint locations, dimensions, and adjacent construction.

b. Provide details for transitions in plane and direction for continuity of seal through watertight transitions from wall expansion joint to other interfacing expansion joint systems at adjacent construction.

2. Product Data: Material description and application instructions.

3. Samples:
a. Minimum 2" x 2" inch joint seal samples showing available colors.

b. Minimum 6" long samples of each joint seal.

B. Informational Submittals:

1. Manufacturer's certification that:

a. Products are capable of withstanding temperature of 150 degrees F for 3 hours while compressed to minimum of movement capability dimension without evidence of bleeding of impregnation medium from material.

b. Same material after heat stability test and after cooling to room temperature will self-expand to maximum of movement capability dimension within 24 hours at 68 degrees F.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. A minimum of 10 years documented experience in production of specified materials.

2. Certified to ISO 9001 and 14001.

B. Installer Qualifications: A minimum of 5 years documented experience installing similar products.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis-of-Design Manufacturer: Products by Sika Emseal, 800-526-8365, www.emseal.com; or Architect approved equal.

2.02 MATERIALS

A. Exterior Wall Joint Seal.

1. Source: Emshield WFR2 by Sika Emseal.

2. Description: Silicone coated, ultraviolet resistant, dual-faced, fire-rated, watertight primary wall seal.

3. Form: Precompressed to less than design joint size, packaged in shrink-wrap packaging.

4. Fire protection rating: 2 hours, tested to UL 2079.
5. Movement capability: Plus and minus 50% (total 100%) of nominal material size.

6. R-value: 1.03 per inch depth at nominal joint size compression, tested to ASTM C518.

7. STC rating: 62 in STC 68 wall, tested to ASTM E90.

8. OITC rating: 52 in OITC 52 wall, tested to ASTM E90.

9. Air permeability: Maximum 0.02 liter per second per square meter, tested to ASTM E283 at 75 Pa.

10. Water penetration: No water penetration, tested to ASTM E331 at 5000 Pa test pressure.

11. Wind loading: No deflection, tested to ASTM E330 at 4954 Pa or 200 MPH wind.

12. VOC Emissions: CDPH-1.2-2017: Pass

13. Color: To be selected from Sika Emseal full color range by Architect.

14. Adhesive: Epoxy type, furnished by joint seal manufacturer.

15. Silicone: Field applied corner bead at face of seal to substrate interface, furnished by joint seal manufacturer, in same material and color as used in factory coating.

    a. Abrasion Resistance: Less than 1% weight loss, tested to ASTM D4060
    b. Fuel Resistance: Pass, tested to ASTM C719/C1135

16. Intumescent Sealant: Field applied to face of joints, furnished by joint seal manufacturer

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean joints thoroughly; remove loose and foreign matter that could impair adhesion or performance.

3.02 INSTALLATION

A. Install joint seal in accordance with Sika Emseal instructions and approved Shop Drawings.

B. Remove joint seal from precompressed packaging, immediately insert into joint, and allow to expand.

C. Use temporary retainers if required to maintain joint seals in position until expansion is complete.

3.03 JOINTS SEAL SCHEDULE

A. Exterior Wall Joint Seals at locations shown on the Drawings: Emshield WFR2 by Sika Emseal.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Related Sections include the following:

1. Section 042000 – Unit Masonry
2. Various Division 07 Roofing Specifications
3. Section 084113 – Aluminum Entrances and Storefronts
4. Section 084413 – Glazed Aluminum Curtain Walls
5. Section 085113 – Aluminum Windows
6. Section 093013 – Ceramic Tile

1.02 WORK INCLUDED

A. The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances, and materials and performing all operations in connection with the application of caulking complete, in strict accordance with this section of the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

1. It is the intent of the caulking work under this Section to provide waterproof seals at all joints where shown on drawings.

B. Joint sealants to be as per the exterior and interior joint sealant schedules at the end of this section.

1.03 REFERENCE STANDARDS

A. ASTM International (ASTM):

1. ASTM C 661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer
2. ASTM C 794 - Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
3. ASTM C834 - Specification for Latex Sealants
4. ASTM C 920 - Specification for Elastomeric Joint Sealants
5. ASTM C 1087 - Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
6. ASTM C 1193 - Guide for Use of Joint Sealants
7. ASTM C 1248 - Test Method for Staining of Porous Substrate by Joint Sealants
8. ASTM C 1311 - Specification for Solvent Release Sealants
9. ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
10. ASTM D 412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
11. ASTM D 624 - Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
12. ASTM D 2240 - Test Method for Rubber Property - Durometer Hardness
13. ASTM E 283 - Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
14. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

B. NSF International (NSF):

1. Standard 51: Food Equipment Materials

C. Sealant, Waterproofing, and Restoration Institute (SWRI):

1. SWRI Validation Program

1.04 SUBMISSIONS

A. Submissions shall be in accordance with Section 013300 - Submittal Procedures, and as modified below.

B. Manufacturer's Data, Sealants and Caulking:

1. Submit three copies of manufacturer's specifications, recommendations, and installation instructions for each type of sealant, caulking compound, and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown.

C. Samples, Sealants and Caulking:

1. Submit three 12" long samples of manufacturer's standard colors for each type of sealant or caulking compound for selection by Architect.

a. Install sample between two strips of material similar to or representative of typical surfaces where sealant or compound will be used, held apart to represent typical joint widths. Samples will be reviewed by Architect for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

D. Guarantee, Sealants:

1. Submit three copies of written guarantee agreeing to repair or replace sealants which fail to perform as air tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability, or appear to deteriorate in any other manner not clearly specified as in inherent quality of the material by submitted manufacturer's data. Provide guarantee in conformance with the requirements of the Contractor’s Guarantee within Specification Section 017000, signed by the installer and Contractor.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Experienced Installer equipped and trained for application of joint sealants required for this Project with record of successful completion of projects of similar scope.

B. Single Source Responsibility: Provide glazing sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.

C. Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit [four] samples of each material that will be in contact with or affect joint sealants. Test sealants with substrate materials using ASTM C794 or manufacturer's standard test methods to determine requirements for joint preparation, including cleaning and priming. Test sealants with related materials to verify compatibility.

D. Preconstruction Field-Adhesion Testing: Prior to installing joint sealants, field test adhesion to joint

substrates using ASTM C1193 Method A or method recommended by manufacturer. Verify adhesion is adequate. Modify joint preparation recommendations for failed joints and re-test. Submit written report to Architect.

E. Mockups: Provide joint sealant application within mockups required in other sections identical to specified joint sealants and installation methods.

1.06 WARRANTY

A. Special Installer's Warranty: Original statement on Installer's letterhead in which Installer agrees to repair or replace joint sealants that demonstrate deterioration or failure within warranty period specified.

1. Warranty Period: As per the Contractor’s Guarantee within Specification Section 017000.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that demonstrate deterioration or failure under normal use within warranty period specified.

1. Warranty Period for Silicone Sealants: 20 years date of Substantial Completion.

C. Warranty Conditions: Special warranties exclude deterioration or failure of joint sealants in normal use due to structural movement resulting in stresses on joint sealants exceeding sealant manufacturer's written specifications, joint substrate deterioration, mechanical damage, or normal accumulation of dirt or other contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Provide joint sealant products manufactured by The Dow Chemical Company, Midland MI; (877) SEALANT ((877) 732-5268); email: construction@dow.com; dow.com/construction; or Architect approved equivalent.

2.02 MATERIALS, GENERAL

A. VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24).

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”

C. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, with joint substrates, and with materials in close proximity under use conditions, as demonstrated by sealant manufacturer by testing and related experience.

D. Joint Sealant Standard: Comply with ASTM C 920 and other specified requirements for each liquid-applied joint sealant.

E. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates indicated for Project.

F. Food Contact Suitability: Where sealants are required to be suitable for contact with food provide sealants complying with 21 CFR 177.2600.

2.03 LIQUID JOINT SEALANTS

A. Joint Sealant #1 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T, NT; SWRI validation.

1. Basis of Design Product: DOWSIL™ 790 Silicone Building Sealant.
2. Hardness, ASTM C 661: 15 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 26 g/L maximum.
4. Staining, ASTM C 1248: None on concrete, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's full line of not less than 10 colors.

B. Joint Sealant #2 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT; SWRI validation.

1. Basis of Design Product: DOWSIL™ 756 SMS Building Sealant.
2. Hardness, ASTM C 661: 35 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 60 g/L maximum.
4. Staining, ASTM C 1248: None on white marble.
5. Color: As selected by Architect from manufacturer's full line of not less than 8 colors.

C. Joint Sealant #3 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, Use NT, G, M and A; SWRI validation.

1. Basis of Design Product: DOWSIL™ 791 Silicone Weatherproofing Sealant.
2. Hardness, ASTM C 661: 34 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 30 g/L maximum.
4. Staining, ASTM C 1248: None on concrete, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's full line of not less than 6 colors.

D. Joint Sealant #4 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT, G, A, and O; SWRI validation.

1. Basis of Design Product: DOWSIL™ 795 Silicone Building Sealant.
2. Hardness, ASTM C 661: 35 - 45 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 32 g/L maximum.
4. Staining, ASTM C 1248: None on concrete, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's full line of not less than 10 colors.

E. Joint Sealant #5 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, for Use NT; SWRI validation.

1. Basis of Design Product: DOWSIL™ 995 Silicone Structural Sealant.
2. Hardness, ASTM D 2240: 35 - 45 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 34 g/L maximum.
4. Ultimate Tensile, ASTM C 1135: 160 psi (1.1 MPa), at 21 day cure (TA Joint).
5. Color: As selected by Architect from manufacturer's full line of not less than 3 colors.

F. Joint Sealant #6 – Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT; SWRI validation.

1. Basis of Design Product: DOWSIL™ 758 Silicone Weather Barrier Sealant.
2. Hardness, ASTM D 2240: 45 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 61 g/L maximum.
4. Color: White.

G. Joint Sealant #7 – Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Basis of Design Product: DOWSIL™ 999A Silicone Building & Glazing Sealant.
2. Hardness, ASTM D 2240: 25 durometer Shore A minimum.
3. Volatile Organic Compound (VOC) Content: 36 g/L maximum.
4. Ultimate Tensile, ASTM D 412: 325 psi (1.2 MPA) at 21 day cure (Dumbbell).
5. Color: As selected by Architect from manufacturer's full line of not less than 6 colors.

H. Joint Sealant #8 – Mildew-Resistant, Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Basis of Design Product: DOWSIL™ 786 Silicone Sealant.
2. Hardness, ASTM D 2240: 25 durometer Shore A.
3. Volatile Organic Compound (VOC) Content: 36 g/L maximum.
4. NSF Standard 51 and FDA Regulation No. 21 CFR 177.2600 compliant.
5. Color: As selected by Architect from manufacturer's standard colors.

I. Latex Joint Sealant: Siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

J. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.

2.04 PRE-FORM JOINT SEALANTS

A. Preformed Silicone Elastomer Extrusion: Highly flexible low-modulus flashing and transition material for bonding to substrates with silicone sealant. SWRI validation.

1. Basis of Design Product: DOWSIL™ 123 Silicone Seal.
2. Surface: Smooth matte, Textured or Grooved to facilitate bending.
3. Bonding Sealant: Manufacturer's recommended neutral-curing silicone.
4. Hardness, ASTM D 2240: 25 durometer Shore A, minimum.
5. Color: As selected by Architect from manufacturer's full line.

B. Preformed Silicone Elastomer Custom Two- and Three- Dimension Extrusion: Highly flexible flashing and transition material for bonding to substrates with silicone sealant.

1. Basis of Design Product: DOWSIL™ 123 Silicone Seal Custom Design H. C.
2. Formulation: General Purpose or High Tear.
3. Shape: Multi-dimensional as indicated on drawings and approved shop drawings and as required to fit and functionally seal specific application and prevent air and water penetration
4. Bonding Sealant: Manufacturer's recommended neutral-curing silicone.
5. Color: As selected by Architect from manufacturer's full line.

2.05 WEATHER BARRIER TRANSITIONS

A. Silicone Elastomer Weather Barrier Transition: Highly flexible clear flashing and transition strip and pre-molded corners for bonding with silicone sealant to weather barrier substrates and to adjacent curtain wall, storefront, and window frames and other transition substrates.

1. Basis of Design Product: DOWSIL™ 123 Silicone Transition Strip (STS).
2. Hardness, ASTM D 2240: 50 - 60 durometer Shore A.

3. Color: Translucent
4. Air Infiltration, ASTM E 283: Maximum 0.025 cfm/sq. ft. (0.127 L/s per sq. m) at 6.24 lbf/sq. ft. (300 Pa).
5. Water Penetration under Static Pressure, ASTM E 331: None at 15 lbf/sq. ft. (720 Pa)
6. Movement Capability: Not less than plus 200, minus 75 percent.
7. Tensile Strength, ASTM D 412: Not less than 800 psi (5.5 MPa).
8. Tear Strength, ASTM D 624: Not less than 200 psi (16 kN/m).
9. Elongation, ASTM D 412: Not less than 400 percent.
10. Bonding Sealant: Manufacturer's recommended neutral-curing silicone.

2.06 ACCESSORIES

A. Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.

B. Premolded Joints for Floors and Paving:

1. Rescor Expansion Joint (W. R. Meadows) or approved equivalent, 1/2-inch thick or as shown; leave 1/2-inch clear space at top to receive sealant.

C. Cylindrical Sealant Backing: ASTM C 1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.

1. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

a. Either flexible, open-cell polyurethane foam or non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.

2. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26°F (-15°C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

D. Bond Breaker Tape: Polymer tape compatible with joint sealant materials and recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back of joint.

E. Primer: As recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Proceed with joint sealant work once conditions meet sealant manufacturer's recommendations.

3.02 PREPARATION

A. Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer.

1. Remove laitance, form-release agents, dust, and other contaminants.
2. Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.

3.03 SEALANT APPLICATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.

C. Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.

D. Joint Backing: Select joint backing materials recommended by sealant manufacturer to be compatible with sealant material. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.

   1. Install bond breaker tape over substrates when sealant backings are not used.

E. Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.

   1. Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.

   2. Using tooling agents approved by sealant manufacturer for application.

F. Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.

   1. Remove masking tape immediately after tooling joint without disturbing seal.

   2. Remove excess sealant from surfaces while still uncured.

3.04 PREFORMED JOINT SEALANT APPLICATION

A. Preparation: Prepare surfaces in accordance with sealant manufacturer's written instructions. Perform field adhesion testing to determine need for application of primer. Clean surfaces to dust free, and perform solvent wipe where recommended. Mask edges of surface to be treated.

B. Application: Apply bead of recommended liquid joint sealant to each side of joint in bead size recommended by manufacturer. Press extrusion into sealant using roller to ensure uniform and complete contact. Lap vertical and horizontal joints as indicated in manufacturer's instructions. Trim preformed joint sealant. Remove masking tape and excess sealant.

3.05 WEATHER BARRIER TRANSITION APPLICATION

A. Preparation: Prepare field of weather barrier surface and surface of adjacent substrate in accordance with sealant manufacturer's written instructions. Perform field adhesion testing to determine need for application of primer. Clean surfaces to dust free, and perform solvent wipe where recommended.

B. Application: Apply bead of recommended liquid joint sealant to each side of joint in bead size recommended by manufacturer. Press transition extrusion into sealant using roller to ensure uniform and complete contact. Lap vertical and horizontal joints as indicated in manufacturer's instructions. Trim transition material. Remove excess sealant.

3.06 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C 1193, Method A.

1. Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate, and one test for each 1000 feet of joint length thereafter or 1 test per each floor per building elevation, minimum.

2. For sealant applied between dissimilar materials, test both sides of joint.

B. Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.

C. Submit report of field adhesion testing to Architect indicating tests, locations, dates, results, and remedial actions taken.

3.07 EXTERIOR JOINT-SEALANT SCHEDULE

A. Exterior construction joints in cast-in-place concrete.

1. Joint Sealant #1: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

B. Exterior movement joints in concrete unit masonry.

1. Joint Sealant #4: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

C. Exterior movement joints in brick masonry.

1. Joint Sealant #4: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

D. Exterior movement joints in stone masonry.

1. Joint Sealant #2: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

E. Exterior joints within exterior insulation finish systems (EIFS).

1. Joint Sealant #1: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

F. Exterior exposed joints in metal panel cladding systems.

1. Joint Sealant #2: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

G. Exterior concealed watertight joints in cladding systems.

1. Joint Sealant #3: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

H. Exterior joints between different materials listed above.

1. Joint Sealant #4: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.
3. Multiple colors required to match several conditions.

I. Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers.

1. Joint Sealant #4: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.
3. Multiple colors required to match several conditions.

J. Exterior joints within aluminum storefront framing, curtain walls, and window systems.

1. Joint Sealant #4: Single-component neutral-curing non-staining silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

K. Exterior joints within structural glazing and protective glass sealant.

1. Joint Sealant #5: Single-component, nonsag, neutral-curing silicone sealant.

L. All other exterior non-traffic joints.

1. Joint Sealant #1: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

M. Exterior horizontal traffic and traffic isolation joints.

1. Joint Sealant #1: Single-component pourable silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

3.08 INTERIOR JOINT-SEALANT SCHEDULE

A. Interior movement joints in exterior concrete and unit masonry.

1. Joint Sealant #4: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

B. Interior perimeter joints of exterior frames.

1. Joint Sealant #3: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

C. Interior movement joints in interior unit masonry.

1. Joint Sealant #4: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

D. Interior perimeter joints of interior frames.

1. Joint Sealant #3: Single-component neutral-curing silicone sealant.
2. Color: As selected by Architect from manufacturer's full range.

E. Interior sanitary joints between plumbing fixtures and food preparation fixtures and casework and adjacent walls, floors, and counters.

1. Joint Sealant #8: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.
2. Color: As selected by Architect from manufacturer's full range to match multiple conditions.

F. Interior traffic joints in floor and between floor and wall construction.

1. Joint Sealant #1: Single-component, nonsag, neutral-curing silicone joint sealant.
2. Color: As selected by Architect from manufacturer's full range.

G. Interior non-moving joints between interior painted surfaces and adjacent materials.

1. Joint Sealant: Siliconized acrylic latex.
2. Color: White; paintable.

H. Interior concealed sealants at thresholds and sills.

1. Joint Sealant: Butyl-rubber-based joint sealant.

I. Interior exposed and non-exposed acoustical applications.

1. Joint Sealant: Acoustical sealant specified in Section 079219 Acoustical Joint Sealants.

END OF SECTION

DIVISION 08 – OPENINGS

081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 SECTION INCLUDES

A. Standard and custom hollow metal doors and frames as indicated and scheduled on drawings.
B. Steel sidelight, borrowed lite and transom frames.
C. Acoustical Rated Doors
D. Louvers installed in hollow metal doors.
E. Light frames and glazing installed in hollow metal doors.
F. Factory finishing hollow metal doors and frames.
G. Items specified elsewhere:

1. Finish hardware is specified elsewhere in Division 8.
2. Building in of anchors and grouting of frames in masonry is specified in Division 04.

1.03 RELATED SECTIONS

A. Section 042000 – Unit Masonry
B. Section 081416 – Flush Wood Doors
C. Section 081433 – Stile and Rail Doors
D. Section 087100 – Door Hardware
E. Section 088000 – Glazing
F. Section 088813 – Fire Rated Glazing
G. Section 088853 – Security Glazing
H. Section 099000 – Painting
I. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.
J. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access control system.

1.04 REFERENCES

A. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames.
B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
E. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
F. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
G. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
H. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

I. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
J. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimens.
K. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
L. ASTM E 413 - Classification for Rating Sound Insulation.
M. ANSI/ASA S12.60 – Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools
N. ASTM E1332 - Standard Classification for Determination of Outdoor-Indoor Transmission Class.
O. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
P. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
Q. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
R. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
T. NFRC 102 – Procedure for Measuring the Steady State Thermal Transmittance of Fenestration Systems.
U. NFRC 400 – Procedure for Determining Fenestration Product Air Leakage.
V. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
W. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.05 SUBMISSIONS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems
9. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
10. Indicate coordination of glazing frames and stops with glass and glazing requirements.

D. Samples: Full range of color samples for Architect selection; 2 samples, 6" square minimum, of each color and texture selected for factory finished doors and frames.

E. Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from an SDI Certified manufacturer. www.steeldoor.org/sdicertified.php

B. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

C. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to UL10C or NFPA 252 at positive pressure (neutral pressure at 40" above sill).

1. Oversize Fire-Rated Door Assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide certificate or label from an approved independent testing and inspection agency, indicating that door and frame assembly conforms to the requirements of design, materials, and construction as established by individual listings for tested assemblies.

2. Temperature Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

3. Smoke Control Door Assemblies: Comply with UL 1784 and NFPA 105.

    a. Smoke "S" Label: Doors to bear "S" label and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

E. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

F. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.

1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements.

    a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.

2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements.

    a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

G. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor

to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

D. Store doors and frames at building site under cover. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately.

2. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.09 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Products shall be manufactured by a member of the Steel Door Institute or an architect approved equivalent. Steel Door Institute Members are as follows:

1. Steel Doors and Frames, (General):

a. Curries.

b. Ceco Door.
c. Deansteel Manufacturing Co.
d. DCI Hollow Metal.
e. Hollow Metal Xpress.
f. Mesker Door, Inc.
g. MPI.
h. Pioneer Industries, Inc.
i. Premier Steel Doors and Frames.
j. Republic Doors & Frames.
k. Security Metal Products Corp.
l. Steelcraft.

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

D. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

E. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

F. Finish: Provide prefinish doors unless otherwise indicated, provide manufacturer's electrostatic paint finish. All other doors to be finished as described in Division 09 - Section 099000.

2.03 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, and ANSI/SDI A250.4 for physical performance level.

1. Design: Flush panel.

2. Core Construction: Foamed in place polyurethane and steel reinforced core with no stiffener face welds.

   a. Provide 18 gauge steel vertical reinforcements 6 inches apart and welded in place. Foamed in place polyurethane core is chemically bonded to all interior surfaces. No face welding is permitted.

   b. Thermal properties to rate at a fully operable minimum U-Factor 0.29 and R-Value 3.4, including insulated door, Mercury thermal-break frame and threshold.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16

gauge (0.053-inch - 1.3-mm) thick steel, Model 2.

4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.

6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9”.

7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.

   a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

2. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.

3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.

4. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.

5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Simulated Woodgrain Embossed Steel Doors: Similar or equal to GrainTech Series as manufactured by Steelcraft, a division of Allegion, PLC, 11819 N. Pennsylvania Street, Carmel, IN 46032; tel. (888) 925-2171. Where so noted in door schedule, provide CE Series embossed steel panel doors featuring deep-embossed panels that create the appearance of wood grained doors; 16 gauge hollow metal door units, in 1-3/4” thickness in sizes as indicated on the doors schedules. All doors shall comply with 1.06 “Quality Assurance” of this specification section, similar to standard steel doors. All Grain-Tech doors shall carry a minimum fire rating of 1 hour, unless otherwise indicated on door schedules.

E. Finished Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

F. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

G. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware," published by Door and Hardware Institute.

H. Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.

I. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

J. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

K. Apply finish coat to doors indicated as prefinished by electrostatically spraying and baking, to produce a paint thickness of 1.25 mils.

2.04 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16” positive thermal break and integral weatherstripping.

C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.

2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.

D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.

2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.

E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.05 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.06 LOUVERS

A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated:

1. Blade Type: Vision proof inverted V or inverted Y.

2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.

2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.07 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lights where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator’s shop. Fixed and removable stops to allow multiple glazed lights each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lights in Doors and Loose Stops for Glazed Lights in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

E. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.

1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.08 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.09 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.

2. Glazed Lights: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.

3. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.

4. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

6. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.

5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.

7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.

8. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

9. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

    a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

10. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

11. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    c. Three anchors per jamb up to 60 inches high.
    d. Four anchors per jamb from 60 to 90 inches high.
    e. Five anchors per jamb from 90 to 96 inches high.
    f. Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    g. Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

12. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

13. Frame Undercoating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water-based frame undercoating or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware;

include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250 specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

A. Remove weld slag and spatter from exposed surfaces. All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth and uniform surfaces. On exposed surfaces where zinc has been removed during fabrication, frame product shall receive a factory applied touch-up primer. Primer shall be fully cured prior to shipment.

B. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

C. Factory Pre-Finished: Factory apply electrostatic paint finish to doors and frames in accordance with ANSI A250.3 test procedure acceptance criteria for steel doors and frames with factory applied finished coatings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified. Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.

4. Grout Requirements: Grout shall be mixed to provide a 4 inch (102 mm) maximum slump consistency, hand troweled into place. Grout mixed to a thin "pumpable" consistency shall not be used.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors in accordance with NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-

inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

D. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

E. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and incomplete and proper operating conditions.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The extent and location of each type of wood door is shown on drawings and schedules.

B. The types of doors required include the following:

1. Factory-finished solid core flush wood doors, with wood-veneer faces.
2. Fire rated flush wood doors.
3. Acoustic (STC) rated wood doors.
4. Matching interior wood frames.

C. Related Sections:

1. Section 081113 – Hollow Metal Doors and Frames.
2. Section 087100 – Finish Hardware.
3. Section 088000 – Glass and Glazing.
4. Section 099000 – Painting.

D. Related Documents: Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

A. It is the intent of the specification that all wood doors shall comply with the standards as listed. The latest published edition of each standard applies.

B. WDMA Interior Architectural Wood Flush Doors Standard.

1. ANSI/WDMA I.S. 1A-21

C. Building Code References.

1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
2. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
3. NFPA 101 – Life Safety Code.
4. IBC – International Building Code.
5. Building Code of New York State. (most current version)
6. New York State Education Department Manual of Planning Standards, Section S109
7. UL 10B-Standard for Fire Tests of Door Assemblies (neutral pressure).
8. UL 10C-Standard for Positive Pressure Fire Tests of Doors.
9. Intertek Warnock Hersey-Listed Product and Code Compliance Directory.
10. QAI Laboratories-Listing Directory for Building Products.
11. ADA Standards for Accessible Design (Current Edition).
12. California Air Resource Board (CARB) –formaldehyde emissions standard.
13. Consumer Products Safety Commission (CPSC) 16 CFR 1201 – Standard for Architectural Glazing

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures, and as modified below.

B. Manufacturer's Data:

1. Submit manufacturer's product data, specifications, and installation instructions for each type of wood door required. Data shall include details of core and edge construction and trim for openings. Include factory-finishing specifications.

2. Submit manufacturer's certificate indicating that doors and louvers meet, or exceed, requirements of indicated fire rating.

C. Shop Drawings: Submit three samples, minimum 12" x 12", showing veneer, core, and edge construction for each type of wood door required. Indicate location, size, and hand of each door, elevation of each kind of door, construction details not covered in Product Data; location and extent of hardware blocking and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire ratings for fire doors.

D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:

1. Faces of Factory-Finished Doors: Show the full range of options available for stained and transparent finishes.

E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

2. Frames for light openings, 6 inches long, for each material, type and finish required.

1.04 QUALITY ASSURANCE

A. In addition to the requirements shown on the drawings and specified in this section, comply with the following standards:

1. NFPA 80 "Standard for Fire Doors and Windows' of the National Fire Protection Association.

2. NWWDA “Guide to Door Face Veneers”.

B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer with a minimum of 10 years’ experience.

1. Provide AWI Quality Certification Labels, or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows," and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard

Methods of Fire Tests of Door Assemblies" & NFPA 252 “Standard Methods of Fire Tests of Door Assemblies” of the National Fire Protection Association by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1. Test Pressure: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.

2. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg. F maximum in 30 minutes of fire exposure.

D. ASTM E119 “Standard Test Methods for Fire Tests of Building Construction Materials”.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard, manufacturer’s written instructions and the WDMA – Appendix Section – “Care and Installation at Job Site”.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheet.

C. Protect wood doors during transit, handling, and storage to prevent damage, soiling, and deterioration. Store inside building in a dry location and stack in accordance with manufacturer's instructions.

D. Mark each door on top and bottom rail with opening number used in shop drawings.

E. Provide protective coverings for shop finished doors at the factory prior to shipping. Use heavy paper cartons and mark with identification required for proper installation.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity at occupancy levels during remainder of construction period.

1.07 MANUFACTURER WARRANTY

A. Submit three copies of written agreement in door manufacturer's standard form signed by the manufacturer, installer, and Contractor agreeing to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup or twist) more whan ¼ inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

B. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

C. Warranty shall be in effect during the following period of time from date of Substantial Completion.

1. Solid-Core Interior Doors: Life of Installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design: The design for flush wood doors is based on Aspiro™ Series, Marshfield-Algoma

by Masonite Architectural, 877.332.4484, masonite.com/architectural/products/aspiro-series specified to indicate requirements for quality and appearance. Subject to compliance with requirements, provide the named product or a comparable product such as the following:

1. VT Industries, Holstein, Iowa.

2.02 MANUFACTURING STANDARDS

A. Interior Flush Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 1A-21 “Industry Standard for Interior Architectural Wood Flush Doors”.

B. Fire-Rated Wood Doors: Conforming to NFPA 80; listed and labeled for required ratings based on testing at positive pressure NFPA 252 or UL 10C by UL or other testing agency acceptable to authorities having jurisdiction.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F above ambient after 30 minutes of standard fire-test exposure.

2. Blocking: Provide composite blocking approved for use in doors of fire-protection ratings indicated as needed to maintain WDMA performance level and eliminate through-bolting hardware.

3. Vertical Edge Construction:

a. Category A Positive Pressure: Integral intumescent seals concealed by outer stile where required.

4. Pairs: Formed-steel edges and astragals with intumescent seals as required for ratings.

a. Steel edges and astragals with baked enamel in color selected by Architect from manufacturer’s standard offering.

C. Acoustical Rating for Solid Core Doors: Where indicated in door schedule on Drawings, provide STC, as indicated on drawings, doors supplied with seals and gaskets tested by manufacturer.

2.03 INTERIOR SOLID CORE FLUSH WOOD DOORS

A. Basis of Design: Aspiro™ Series | Marshfield-Algoma™ by Masonite Architectural.

B. Solid Core Select Wood Veneer Flush Doors

1. WDMA Quality grade: Premium

2. WDMA Performance Level: Extra Heavy Duty

3. Faces:

a. Veneer Grade: A
b. Veneer Species: White Oak or Maple; as selected by Architect.
c. Veneer Cut: Plain Sliced
d. Veneer Leaf Match: Book Match
e. Veneer Face Match/ Assembly: Center-balance

4. Pair Match: Provide for doors hung in same opening or separated only by mullions.

5. Vertical Edges: Structural Composite Lumber. Matching/Compatible Hardwood lumber that matches face veneer.

6. Horizontal Edges: Structural composite lumber. Hardwood

7. Core: Structural composite lumber (SCLC).

8. Construction: Five Plies; stiles and rails bonded to core, and entire unit is abrasive planed before veneering.

9. Thickness: 1-3/4 inch.

C. Solid Core Select Wood Veneer Flush Doors with Glazed Lites

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. Glazing: Refer to Specification Section 088000 – Glazing.

3. Metal Glazing Frames: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish.

   a. Frame Design: Metal Vision Frame 110 for standard vision lite.
   b. Frame Design: Metal Vision Frame 115-L1 for insulated glass.

D. Solid Core Select Wood Veneer Flush Doors with Louvers

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. Metal Louvers: 600A1; Paint finish in color selected by Architect from manufacturer’s standard colors.

E. Fire-Rated Select Wood Veneer Flush Doors

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. Category A positive pressure.

3. Core:

   a. 20-Minute Doors: Structural composite lumber core.
   b. 45-Minute Doors: Mineral core with blocking options.
   c. 60-, 90-Minute Doors: Mineral core with blocking options.

      1) Blocking Options: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated:

         a) 5-inch top-rail blocking.
         b) 5-inch bottom-rail blocking.
         c) 5-inch mid-rail blocking with 5-by-10-inch lock blocks.

4. Vertical Edges:

   a. 20-Minute Doors: Matching 1/8 inch high impact edge bonded to structural composite

lumber.

b. 45-, 60-, 90-Minute Mineral Core Doors: Matching 1/8 inch (3.2mm) high impact edge bonded to structural composite lumber.

5. Horizontal Edges:

a. 20-Minute Doors: Structural composite lumber.
b. 45-, 60-, 90-Minute Doors: Manufactures standard construction per label service listing.

F. Fire-Rated Select Wood Veneer Flush Doors with Glazed Lites

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. Glazing: Refer to Specification Section 088813 – Fire Rated Glazing.

3. Metal Glazing Frames: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish.

a. Frame Design: Metal Vision Frame 110 for standard vision lite.
b. Frame Design: Metal Vision Frame 115-L1 for insulated glass.

G. Fire-Rated Select Wood Veneer Flush Doors with Louvers

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. Louvers for fire-rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.

3. Metal and Finish: 18 gauge cold rolled steel, with manufacturer's standard color baked-enamel- or powder-coated finish.

2.04 ACOUSTIC (STC) RATED INTERIOR FLUSH WOOD DOORS

A. Acoustic Rated Interior Flush Wood Doors

1. Match appearance grade and applicable construction and performance requirements of other standard veneer flush solid core wood doors.

2. STC Ratings: Certified by manufacturer on basis of testing per ASTM E90 and E413. Rating requirements are stated in the door schedule on the Drawings.

3. Provide gasketing and mortise door bottom as required to meet manufacturers tested acoustic rating.

B. Coordination: STC-Rated Doors: Where installed in hollow metal frames, fill frames with compressed mineral wool insulation.

2.05 DOOR CORE MATERIALS

A. Structural Composite Lumber: WDMA T.M.10.

2.06 TRANSPARENT FINISH WOOD DOORS FRAMES

A. Provide wood door frames where indicated on the drawings and schedules.

B. Material: Solid lumber that matches species of door veneer.

C. Frame Profile: Custom double rabbet.

D. Trim: Solid lumber that matches species of door veneer.

E. Trim Stile: Colonial Casing, Contemporary Casing, Sleek Casing or Traditional Casing as indicated on the drawings and selected by Architect.

F. Fire Rating: Match rating of door.

2.07 FABRICATION

A. Door Pairs:

1. Veneer Matching: Running match.

B. Transoms and Side Panels: Same construction as adjacent doors.

1. Transom Veneer: Continuous match.

C. Factory Fitting: Fit to frame openings with clearances specified in WDMA I.S. 1A.

1. Comply with clearance requirements of referenced quality standard for fitting.

2. Undercut: Maximum 5/8 inch unless otherwise indicated on the drawings.

3. Fire-Rated Doors: Comply with NFPA 80.

a. In accordance with NFPA-80, Section 1-7, Glazing Material, Fire protection rated glazing (vision panels) must be installed in approved steel frames.
b. Glazing for openings through doors, such as ceramic fire rated safety glass, shall be fitted into trim openings and well embedded in putty.

D. Factory Machining: Machine doors for hardware that is not surface applied.

1. Verify dimensions for hardware mortises in metal frames before machining.

2. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

3. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

E. Openings:

1. Cut and trim openings at factory.

2. Cut openings and install louvers at factory.

F. Exterior Doors:

1. Treat with water-repellent preservative per WDMA I.S.4.

2. Flash tops of outswinging doors with stainless steel.

G. Contractor Option: Doors supplied with wood frames may have hardware installed at factory:

H. Door Frames:

1. Supply frames with temporary spreader bars at base.

2.08 FINISHES

A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.

B. Finish all door surfaces at factory.

C. Finish Grade: Match grade of door

D. Transparent: WDMA TR-8, UV-Cured Acrylated Polyester/Urethane.

1. Staining: Standard color selected by Architect or custom color to match Architect's sample when noted on the Drawings.

2. Sheen: Satin.

E. Restore finish on all edges of shop-finished doors before installation.

F. Drips and runs of paint, stain, primer, or sealer are not acceptable.

2.09 FIRE RATED DOORS

A. Comply with applicable requirements of AWI 1300 and NFPA 80 "Standard for Fire Doors and Windows" for fire ratings indicated on drawings and in schedule.

B. Provide doors which have been tested and rated by Underwriter's Laboratories, Inc. (UL) for the fire ratings and class indicated in the schedule using single-point hardware.

1. Attach UL classification Marking label indicating door type, rating, class, and temperature rise to edge of each fire-rated door.

C. Provide veneer and finish to match non-fire-rated doors in the same area of building, unless otherwise indicated.

D. Door assemblies in corridors and smoke barriers shall be tested in accordance with NFPA 252 or UL 10C.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine doors and installed door frames prior to hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location and swing characteristics and have been installed with level heads and plumb jambs.

2. Inspect each door before installation for damage and defects per WDMA Section F-6.

B. Proceed with installation, only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Condition doors to average prevailing humidity in installation area prior to hanging.

B. Fit doors to frames and machine for hardware.

3.03 INSTALLATION

A. Reference Standards:

1. Wood Doors: WDMA I.S. 1A.
2. Fire-Rated Doors: NFPA 80.
3. Smoke-and Draft-Control Doors: NFPA 105.

B. Install wood doors in accordance with manufacturer's instructions. Adjust for proper fit, uniform clearance at each edge, and smooth balanced door movement. For installation of finish hardware, refer to Section 087100 – Door Hardware.

C. Provide clearance for doors of 3/32" at jambs and heads and 3/8" at bottom, unless otherwise indicated.

1. For fire rated doors, provide clearances complying with the limitation of the authority having jurisdiction. Install fire-rated doors into corresponding fire-rated frames, according to NFPA 80.

2. Allow extra clearance as required for thresholds, carpet, and similar materials.

D. Job-fitted use: Align and fit doors in frames with a uniform clearances and bevels as indicated below. Do not trim stiles and rails in excess of limits set by the manufacturer or permitted for fire-rated doors. Machine doors for hardware; seal cut surfaces after fitting and machining.

E. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.

F. Comply with NFPA 80 for fire-rated doors.

G. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

H. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

I. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.04 ADJUSTING & REPAIR

A. Operation: Re-hang or replace doors what do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with the requirements and shows no evidence of repair or refinishing.

C. Repair of damage or defects is subject to Architect’s acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

3.05 PROTECTING AND CLEANING

A. Protect installed doors from damage and soiling during construction.

B. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components
3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Section 061000 – Rough Carpentry
2. Section 062000 – Finish Carpentry
3. Section 079200 – Joint Sealants for sealant requirements applicable to threshold installation specified in this section.
4. Section 081113 – Hollow Metal Doors and Frames
5. Section 081416 – Flush Wood Doors
6. Section 081433 – Stile and Rail Doors
7. Section 084113 – Aluminum Entrances and Storefronts
8. Section 084114 – Aluminum Security Framed Entrances and Storefronts
9. Section 084123 – Fire Rated Aluminum Framed Entrances and Storefronts
10. Section 087113 – Automatic Door Operator
11. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
12. Division 26 “Electrical” sections for connections to electrical power system and for low-voltage wiring.
13. Division 28 “Electronic Safety and Security” sections for coordination with other components of electronic access control system and fire alarm system.

1.02 SUMMARY

A. UL, LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule

2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

E. New York State Education Department Manual of Planning Standards

1. Section S110

1.03 SUBMITTALS

D. General:

1. Submit in accordance with Conditions of Contract and Section 013300 – Submittal Procedures.
2. Prior to forwarding submittal:

a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

E. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:

a. Wiring Diagrams: For power, signal, and control wiring and including:
1) Details of interface of electrified door hardware and building safety and security systems.
2) Schematic diagram of systems that interface with electrified door hardware.
3) Point-to-point wiring.
4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

    a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:

    a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    c. Indicate complete designations of each item required for each opening, include:
        1) Door Index: door number, heading number, and Architect's hardware set number.
        2) Quantity, type, style, function, size, and finish of each hardware item.
        3) Name and manufacturer of each item.
        4) Fastenings and other pertinent information.
        5) Location of each hardware set cross-referenced to indications on Drawings.
        6) Explanation of all abbreviations, symbols, and codes contained in schedule.
        7) Mounting locations for hardware.
        8) Door and frame sizes and materials.
        9) Degree of door swing and handing.
        10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:

    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

F. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:

    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    b. Include warranties for specified door hardware.

G. Closeout Submittals:

3. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

    a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Final approved hardware schedule edited to reflect conditions as installed.
    d. Final keying schedule
    e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
    f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

H. Inspection and Testing:

4. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:

    a. fire door assemblies, in compliance with NFPA 80.
    b. required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:

    a. For door hardware: DHI certified AHC or DHC.
    b. Can provide installation and technical data to Architect and other related subcontractors.
    c. Can inspect and verify components are in working order upon completion of installation.
    d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:

    a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
    b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:

    a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware

    a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:

    a. Comply with governing accessibility regulations cited in “REFERENCES” article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference

    a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
        1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
        2) Preliminary key system schematic diagram.
        3) Requirements for key control system.
        4) Requirements for access control.
        5) Address for delivery of keys.

2. Pre-installation Conference

    a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    b. Inspect and discuss preparatory work performed by other trades.
    c. Inspect and discuss electrical roughing-in for electrified door hardware.
    d. Review sequence of operation for each type of electrified door hardware.
    e. Review required testing, inspecting, and certifying procedures.
    f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:

    a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer’s original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer’s published listings.

a. Mechanical Warranty
   1) Locks
      a) Mortise: 3 years
      b) Cylindrical: 10 years
      c) Falcon: 10 years
   2) Exit Devices
      a) 3 years
   3) Closers
      a) 25 years
   4) Automatic Operators
      a) 2 years

b. Electrical Warranty

1) Locks
   a) 1 year
2) Exit Devices
   a) 1 year
3) Closers
   a) 2 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of alternate manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category are only to be considered by official substitution request in accordance with the Instructions to Bidders.

B. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

D. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. Ives 5BB series

2. Acceptable Manufacturers and Products:

a. Hager BB1191/1279 series
b. McKinney TB series
c. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:

a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:

a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

a. Steel Hinges: Steel pins

b. Non-Ferrous Hinges: Stainless steel pins
c. Out-Swinging Exterior Doors: Non-removable pins
d. Out-Swinging Interior Lockable Doors: Non-removable pins
e. Interior Non-lockable Doors: Non-rising pins

10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Select
b. Roton
c. ABH

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:

a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:

a. ABH PT1000
b. Securitron CEPT-10
c. Security Door Controls PTM

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLOOR CLOSERS

A. Manufacturers:

3. Scheduled Manufacturer:

a. Dormakaba

4. Acceptable Manufacturers:

b. Jackson
c. Rixson

B. Requirements:

1. Provide floor closers complete with ball-bearing top pivot, floor plates, intermediate pivots and cement boxes unless indicated otherwise.
2. Provide one intermediate pivot for single-acting doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
3. Provide floor closers with adjustable swing speed, latch speed, back-check, and built in positive stop at specified degree of opening.
4. Spring Power: Continuously adjustable over full range of closer sizes, with reduced opening force for physically handicapped.
5. Hydraulic Regulation: By tamper-proof, non-critical valves. Provide separate adjustment for latch speed, general speed, and backcheck.
6. Provide appropriate model where floor closers are specified at fire rated openings.
7. Provide lead-lined model where floor closers are specified at lead-lined doors.
8. Provide pivots with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
9. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.07 PIVOT SETS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Dormakaba
b. Rixson
c. ABH

B. Requirements:

1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
4. Provide lead-lined model where pivot sets are specified at lead-lined doors.
5. Provide pivots with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
6. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.08 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Rockwood
b. DCI
c. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.09 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Rockwood
b. DCI
c. Trimco

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.

2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.10 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:

   a. Accurate 9000/9100 series
   b. Sargent 8200 series
   c. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified locksets that comply with the following requirements:

   a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
   b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
   c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
   d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
   e. Connections – provide quick-connect Molex system standard.

8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

   a. Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
   b. Lever Design: Schlage see hardware groups.

2.11 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. Schlage ND series

2. Acceptable Manufacturers and Products:

   a. Sargent 11-Line
   b. Corbin-Russwin CL3100 series
   c. Best 9K series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

   a. Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
   b. Lever Design: Schlage Rhodes.

2.12 DEADLOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. Schlage L400 series

2. Acceptable Manufacturers and Products:

   a. Best 38H series
   b. Sargent 4870 series

B. Requirements:

1. Provide mortise deadlock series conforming to ANSI/BHMA A156.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide deadlocks with standard 2-3/4 inches (70 mm) backset. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
4. Provide manufacturer’s standard strike.

2.13 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

    a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:

    a. Precision APEX 2000 series
    b. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:

    a. **SI**: Provide dogging indicators for visible indication of dogging status.
    b. **QM**: Rim Exit Devices: provide devices with damper-controlled re-latching to reduce operational noise. Where lever trim is specified, provide damper controlled lever return.
    c. **CVC**: Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
        1) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
        2) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
        3) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.

4) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
5) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
6) Product Cycle Life: 1,000,000 cycles.
7) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
8) Latch release does not require separate trigger mechanism.
9) Cable and latching system characteristics:
    a) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
    b) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
    c) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
    d) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
    e) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.14 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

    a. Von Duprin 6000 Series.

2. Acceptable Manufacturers and Products:

    a. Folger Adam 300 Series
    b. HES 1006 Series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.15 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

    a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:

    a. Precision ELR series
    b. Sargent 3500 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:

    a. 12/24 VDC Output, field selectable.
    b. Class 2 Rated power limited output.
    c. Universal 120-240 VAC input.
    d. Low voltage DC, regulated and filtered.
    e. Polarized connector for distribution boards.
    f. Fused primary input.
    g. AC input and DC output monitoring circuit w/LED indicators.
    h. Cover mounted AC Input indication.
    i. Tested and certified to meet UL294.
    j. NEMA 1 enclosure.
    k. Hinged cover w/lock down screws.
    l. High voltage protective cover.

2.16 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:

    a. Match Existing

2. Acceptable Manufacturers and Products:

    a. No Substitute

B. Requirements:

1. Provide permanent or interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.17 KEYING

A. Scheduled System:

1. New factory registered system:

    a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

    OR

2. Existing factory registered system:

    b. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

OR

3. Existing non-factory registered system:

    c. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact information by Owner.

B. Requirements:

1. Construction Keying:

    a. Replaceable Construction Cores. (OPTION: if using temporary construction cores in IC core cylinder in either F/S or S/F.)
        1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
            a) 3 construction control keys
            b) 12 construction change (day) keys.
        2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:

    a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

        1) Master Keying system as directed by the Owner.

    b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
    c. Provide keys with the following features:
        1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
        2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
        3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.

    d. Identification:

        1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
        2) Identification stamping provisions must be approved by the Architect and Owner.
        3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
        4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
        5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

    e. Quantity: Furnish in the following quantities.

        1) Change (Day) Keys: 3 per cylinder/core.
        2) (OPTION for interchangeable cores) Permanent Control Keys: 3.

3) Master Keys: 6.

2.18 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:

a. Telkee

2. Acceptable Manufacturers:

a. HPC
b. Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.

a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
b. Provide hinged-panel type cabinet for wall mounting.

2.19 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. LCN 4010/4110/4020 series

2. Acceptable Manufacturers and Products:

b. Corbin-Russwin DC8000 series
c. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.

7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.20 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. LCN 4050A series

2. Acceptable Manufacturers and Products:

   a. Norton 7500 series
   b. Sargent 351 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.21 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. LCN 4600 series

2. Acceptable Manufacturers and Products:

   a. Norton 6000 series
   b. Besam Power Swing

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide wireless actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.22 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives.

2. Acceptable Manufacturers:

a. Trimco
b. Rockwood

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.23 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Trimco
b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.24 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:

a. Glynn-Johnson

2. Acceptable Manufacturers:

a. Rixson
b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.25 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Trimco
b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.26 THRESHOLDS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Pemko

2. Acceptable Manufacturers:

a. No Substitute

B. Requirements:

3. Provide thresholds as specified and per architectural details. Match finish of other items.
4. For Level floor use 2548A
5. For 3/8” offset use 200A x 228 A
6. For 1/2” offset use R.50.SMRAK
7. For 3/4" offset use R.75.SMRAK
8. Over 3/4" offset use R.VARI/AK

2.27 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Rockwood
b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.28 ROLLER LATCHES

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Rockwood
b. Trimco

B. Requirements:

1. Provide roller latches with 4-7/8 inches (124 mm) strike at single doors to fit ANSI frame prep. If dummy levers are used in conjunction with roller latch mount roller latch at a height as to not interfere with proper mounting and height of dummy lever.
2. Provide roller latches with 2-1/4 inches (57 mm) full lip strike at pair doors. Mount roller in top rail of each leaf per manufacturer’s template.

2.29 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. LCN

2. Acceptable Manufacturers:

a. Rixson
b. Sargent

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.20 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
2. Field modify and prepare existing doors and frames for new hardware being installed.

3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:

    a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
    b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
    c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer’s instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Construction Cores Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.

5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect’s opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

C. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes during the final adjustment of hardware.

D. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by a representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore to proper function of doors and hardware. Consult with and instruct the Owner's personnel in recommended additions to the

maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials, or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

86226 X-54911 Version 1

HARDWARE SET NO. 01 - SINGLE CLASSROOM SECURITY - MORTISE
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071L 06N IS-LOC CHANGE LEVER TO MATCH EXISTING		630	SCH
2	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 01A - SINGLE CLASSROOM SECURITY - CYLINDRICAL
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	ND78 RHO IS-CRS CHANGE LEVER TO MATCH EXISTING		626	SCH
2	EA	INTERCHANGABLE CORE	TO MATCH EXISTING SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 02 - SINGLE EXIT LOCKDOWN
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-2SI-06 CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 03 - PAIR EXITS LOCKDOWN - ASSEMBLY - NO MULLION
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE EXIT HARDWARE	9827-EO-F-LBRAFL-499F		630	VON
1	EA	FIRE EXIT HARDWARE	9827-L-F-2SI-LBRAFL-06-499F CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 03A - PAIR EXITS LOCKDOWN - ASSEMBLY - NO MULLION - MAG HOLD OPEN

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE EXIT HARDWARE	9827-EO-F-LBRAFL-499F		630	VON
1	EA	FIRE EXIT HARDWARE	9827-L-F-2SI-LBRAFL-06-499F CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	MAGNET	SEM7830 12V/24V/120V PROVIDE EXTENSIONS AS REQUIRED		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 04 - PAIR EXITS LOCKDOWN - ASSEMBLY - REMOVABLE MULLION

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE RATED REMOVABLE MULLION	KR9954		689	VON
1	EA	FIRE EXIT HARDWARE	98-EO-F		630	VON
1	EA	FIRE EXIT HARDWARE	98-L-F-2SI-06 CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM FOR MULLION		626	
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 04A - PAIR EXITS LOCKDOWN - ASSEMBLY - REMOVABLE MULLION - MAG HOLD OPEN

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE RATED REMOVABLE MULLION	KR9954		689	VON
1	EA	FIRE EXIT HARDWARE	98-EO-F		630	VON
1	EA	FIRE EXIT HARDWARE	98-L-F-2SI-06 CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM FOR MULLION		626	
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	MAGNET	SEM7830 12V/24V/120V PROVIDE EXTENSIONS AS REQUIRED		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 05 - PAIR CORRIDOR - NON-LOCKING

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-BE-F-LBRAFL-06-499F CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 05A - PAIR CORRIDOR - NON-LOCKING - MAG HOLD OPEN

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-BE-F-LBRAFL-06-499F CHANGE LEVER TO MATCH EXISTING		630	VON
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX		630	IVE
2	EA	MAGNET	SEM7830 12V/24V/120V PROVIDE EXTENSIONS AS REQUIRED		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 06 - SINGLE OCCUPANCY TOILET WITH INDICATOR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	PRIVACY LOCK	L9040 06N L583-363 ODS-OCC CHANGE LEVER TO MATCH EXISTING		630	SCH
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 07 - GANG TOILET - MORTISE

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM LOCK	L9070L 06N CHANGE LEVER TO MATCH EXISTING		630	SCH
2	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 07A - GANG TOILET - CYLINDRICAL

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM LOCK	ND70 RHO CHANGE LEVER TO MATCH EXISTING		626	SCH
2	EA	INTERCHANGABLE CORE	TO MATCH EXISTING SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP MOUNT CLOSER INSIDE CLASSROOM		689	LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 08 - GANG TOILET - MORTISE - AUTO OPERATOR
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM LOCK	L9070L 06N CHANGE LEVER TO MATCH EXISTING		630	SCH
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC		630	VON
1	EA	SURF. AUTO OPERATOR	4631 WMS 120 VAC USE 4642 WHEN PUSH SIDE MOUNT IS NEEDED		689	LCN
1	EA	ACTUATOR, TOUCH	8310-853TWP		630	LCN
1	EA	RECEIVER	8310-865			LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS OMIT AT CLASSROOM DOORS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH

HARDWARE SET NO. 08A - GANG TOILET CLYINDRICAL - AUTO OPERATOR
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM LOCK	ND70 RHO CHANGE LEVER TO MATCH EXISTING		626	SCH
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC		630	VON
1	EA	SURF. AUTO OPERATOR	4631 WMS 120 VAC USE 4642 WHEN PUSH SIDE MOUNT IS NEEDED		689	LCN
1	EA	ACTUATOR, TOUCH	8310-853TWP		630	LCN
1	EA	RECEIVER	8310-865			LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS OMIT AT CLASSROOM DOORS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH

HARDWARE SET NO. 09 - SINGLE FRP EXTERIOR
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD		630	VON
1	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	FLUSH PULL	BY DOOR MANUFACTURER			
1	EA	SURFACE CLOSER	4040XP HCUSH		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

HARDWARE SET NO. 09A - SINGLE FRP EXTEROR - ELECTRIC STRIKE
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD		630	VON
1	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6111 FSE CON 12/24 VAC/VDC		630	VON
1	EA	FLUSH PULL	BY DOOR MANUFACTURER			
1	EA	SURFACE CLOSER	4040XP HCUSH		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			
1	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR			
1	EA	CREDENTIAL READER/DOOR RELEASE	BY SECURITY CONTRACTOR			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

HARDWARE SET NO. 10 - PAIR FRP EXTERIOR
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954		689	VON
1	EA	PANIC HARDWARE	CD-98-EO		630	VON
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
3	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
2	EA	FLUSH PULL	BY DOOR MANUFACTURER			
2	EA	SURFACE CLOSER	4040XP HCUSH		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

HARDWARE SET NO. 10A - PAIR FRP EXTERIOR - ELECTRIC STRIKE
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	REMOVABLE MULLION	KR4854		689	VON
1	EA	PANIC HARDWARE	CD-98-EO		630	VON
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD		630	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
3	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6111 FSE CON 12/24 VAC/VDC		630	VON
2	EA	FLUSH PULL	BY DOOR MANUFACTURER			
2	EA	SURFACE CLOSER	4040XP HCUSH		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			
2	EA	WIRE HARNESS	CON-50 FOR USE INSIDE MULLION			SCH
2	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR			
1	EA	CREDENTIAL READER/DOOR RELEASE	BY SECURITY CONTRACTOR			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

HARDWARE SET NO. 11 - SINGLE ALUMINUM EXTEROR - ELECTRIC STRIKE
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		628	IVE
1	EA	PANIC HARDWARE	CD-35A-NL-OP-388		626	VON
1	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6111 FSE CON 12/24 VAC/VDC		630	VON
1	EA	FLUSH PULL	BY DOOR MANUFACTURER			
1	EA	OH STOP & HOLDER	90H		630	GLY
1	EA	SURFACE CLOSER	4021		689	LCN
1	EA	FLUSH CEILNG MTG PLATE	4020-18G SRT		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			
1	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR			
1	EA	CREDENTIAL READER/DOOR RELEASE	BY SECURITY CONTRACTOR			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

HARDWARE SET NO. 12 - PAIR ALUMINUM EXTERIOR - ELECTRIC STRIKE
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4854		689	VON
1	EA	PANIC HARDWARE	CD-35A-EO		626	VON
1	EA	PANIC HARDWARE	CD-35A-NL-OP-388		626	VON
2	EA	RIM CYLINDER	TO MATCH EXISTING SYSTEM		626	
3	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6111 FSE CON 12/24 VAC/VDC		630	VON
2	EA	FLUSH PULL	BY DOOR MANUFACTURER			
2	EA	OH STOP & HOLDER	90H		630	GLY
2	EA	SURFACE CLOSER	4021		689	LCN
2	EA	FLUSH CEILNG MTG PLATE	4020-18G SRT		689	LCN
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER			
1	EA	THRESHOLD	SEE BELOW			
2	EA	WIRE HARNESS	CON-50 FOR USE INSIDE MULLION			SCH
1	EA	WIRE HARNESS	CON-6W FROM ELECTRIC STRIKE			SCH
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR			
1	EA	CREDENTIAL READER/DOOR RELEASE	BY SECURITY CONTRACTOR			

NOTE:
FOR LEVEL FLOOR USE: 2548A
FOR 3/8" OFFSET USE: 200A X 228A
FOR 1/2" OFFSET USE: R.50.SMRAK
FOR 3/4" OFFSET USE: R.75.SMRAK
OVER 3/4" OFFSET USE: R.VARI/AK

FOR DOOR REPLACEMENT PROJECTS THE FOLLOWING WORK SCOPE SHALL BE INCLUDED:

EXISTING FRAME:
NOTE: CONTRACTOR TO FILL/PATCH ANY OLD HARDWARE PREPARATIONS IN EXISTING FRAME THAT WILL BE NO LONGER USED WITH NEW DOOR/HARDWARE. CONTRACTOR IS RESPONSIBLE FOR ANY NEW MORTISES/HARDWARE PREPARATION TO EXISTING FRAME TO ACCOMMODATE NEW DOOR AND HARDWARE.

EXISTING DOOR AND FRAME:
NOTE: CONTRACTOR TO FILL/PATCH ANY OLD HARDWARE PREPARATIONS IN EXISTING DOOR AND FRAME THAT WILL NO LONGER BE USED WITH NEW HARDWARE. CONTRACTOR IS RESPONSIBLE FOR ANY MODIFICATIONS TO DOOR AND/OR FRAME AS REQUIRED TO MOUNT NEW DOOR HARDWARE, INCLUDING MORTISES, REINFORCEMENTS AND ALL PREPARATION OF THE EXISTING MATERIAL.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 092300 – GYPSUM PLASTER

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Gypsum and metal lath bases for the support of gypsum plaster used as a finish for partitions and ceilings where indicated on the drawings and as specified herein.

B. Accessories, Cornerite™, corner beads, and casing beads as required.

C. Drawings and General Provisions of the Contract, including General Conditions and Supplementary Conditions and Division 01 specification section, apply to work of this section.

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Section 042000 – Unit Masonry
B. Section 054000 – Cold Formed Metal Framing
C. Section 061000 – Rough Carpentry
D. Section 079200 – Joint Sealants
E. Section 092900 – Gypsum Wall Board
F. Section 099000 – Painting

1.03 SUBMISSIONS

A. Submit to the Architect for approval samples as described in General and Supplementary Conditions and do no work and order no materials prior to written approval. Installed work must conform exactly to approved samples.

B. Product Data: Manufacturers' specifications and installation instructions for each product specified.

C. Shop Drawings: Show layout of control joints.

D. To avoid unnecessary samples, only those described below will be requested. However, as part of the Contract, when requested by the Architect, additional samples are to be promptly submitted.

E. Identify completely all samples. Describe material, gauge, size, treatment, texture, finish, where to be used, and color or colors when applicable. Include names of project, Architect, Contractor, vendor, and manufacturer.

F. Submit in duplicate:

1. Sample panels (each finish): 12" x 12".

1.04 APPLICABLE STANDARDS

A. American Society for Testing and Materials (ASTM):

B. A 641, Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
C. C 28, Specification for Gypsum Plasters.
D. C 35, Specification for Inorganic Aggregates for Use in Gypsum Plaster.
E. C 37, Specification for Gypsum Lath.
F. C 59, Specification for Gypsum Casting and Molding Plaster.

G. C 841, Specification for Installation of Interior Lathing and Furring.
H. C 842, Specification for Application of Interior Gypsum Plaster.
I. C 847, Specification for Metal Lath.
J. C 954, Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.33 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
K. C 587, Specification for Gypsum Veneer Plaster.
L. C 1002, Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
M. C 1396, Specification for Gypsum Board (Gypsum Base for Veneer Plaster).

1.05 QUALITY ASSURANCE

A. Mock-Ups:

1. Lath and plaster an actual wall surface for each finish specified to show color, texture, and workmanship. Provide mock-ups of at least 100 sq. ft. Obtain the Architect's approval of mock-up locations.

2. Simulate finished lighting conditions for the Architect's review of mock-up.

3. Do not start plastering until mock-up is approved by the Architect. Provide additional mock-ups if necessary to obtain approval. Do not alter mock-ups until plastering is completed.

1.06 DELIVERY, QUALITY ASSURANCE

A. Packaging and Shipping: Have materials shipped in manufacturer's original packages showing manufacturer's name and product brand name.

B. Storage and Protection: Store materials inside and protected from damage by the elements. Protect ends, edges, and faces of gypsum lath from damage. Protect metal framing and accessories from bending.

1.07 PROJECT CONDITIONS

A. Environmental Requirements: Comply with ASTM C 842.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Gold Bond Building Products, LLC provided by National Gypsum Company; or Architect approved equal.

1. Gypsum Lath:

a. Regular: Gold Bond® Kal-Kore® Plaster Base.

2. Gypsum Plaster:

a. Base Plaster: Gold Bond® Gypsolite® Plaster.
b. Finish Plaster: Gold Bond® Kal-Kote® Smooth Finish Plaster.

2.02 MATERIALS

A. Metal Framing:

1. Studs: See Section 054000.

2. Main Runner Channels: 2 in. cold rolled steel channel, weighing 590 lbs. per 1000 lin. ft. with min. base steel of 0.054 in., galvanized or painted.

3. Main Runner Channels: 1-1/2 in. cold rolled steel channel, weighing 475 lbs. per 1000 lin. ft. with min. base steel of 0.054 in., galvanized or painted.

4. Cross Furring Channels: 3/4 in. cold rolled steel channel, weighing 300 lbs. per 1000 lin. ft. with min. base steel of 0.054 in., galvanized or painted.

5. Channel Studs: 3/4 in. cold rolled steel channel, weighing 300 lbs. per 1000 lin. ft. with min. base steel of 0.054 in., galvanized or painted.

6. Floor and Ceiling Runner: L shaped runner, weighing 545 lbs. per 1000 lin. ft. with min. base steel of 0.0329 in., galvanized.

B. Wood Framing: See Section 061000.

C. Metal Lath:

1. Diamond Mesh Lath: Expanded metal lath with 5/16 in. wide diamonds, weighing 2.5 lbs. and 3.4 lbs. per sq. yd., galvanized or painted steel, and complying with ASTM C 847.

2. Self-Furring Lath: Expanded metal lath with 5/16 in. wide diamonds, weighing 2.5 lbs. and 3.4 lbs. per sq. yd., with self-furring dimples to hold the lath 1/4 in. away from the substrate, galvanized or painted steel, and complying with ASTM C 847.

3. Rib Lath: Expanded metal with 1/8 in. deep solid metal ribs at 1-1/2 in. o.c., weighing 2.75 lbs. and 3.4 lbs. per sq. yd., galvanized or painted steel, and complying with ASTM C 847.

4. Rib Lath: Expanded metal with opposed, U shaped, 3/8 in. deep, solid metal ribs at 1-15/16 in. o.c.; weighing 3.4 lbs. per sq. yd.; galvanized or painted steel; and complying with ASTM C 847.

D. Gypsum Lath:

1. Regular: A gypsum core lathing panel surfaced with absorptive paper on front, back, and long edges and complying with ASTM C 1396 (Gold Bond® Kal-Kore® Plaster Base).

    a. Thickness: 1/2 in.
    b. Width: 4 ft.
    c. Length: 8 ft. through 16 ft.
    d. Edges: Square or Tapered.

2. Fire-Rated: A gypsum core lathing panel with additives to enhance the fire resistance of the core and surfaced with absorptive paper on front, back, and long edges and complying with ASTM C 1396, Type X.

    a. Thickness: 1/2 in. (Gold Bond® Kal-Kore® Fire-Shield C™ 1/2” Plaster Base) or 5/8 in. (Gold Bond® Kal-Kore® Fire-Shield® and Gold Bond® Kal-Kore® Fire-Shield C™ 5/8” Plaster Base).
    b. Width: 4 ft.
    c. Length: 8 ft. through 16 ft.
    d. Edges: Square or Tapered.

E. Gypsum Plaster:

1. Base Plaster: Gypsum plaster with mill-mixed perlite aggregate complying with ASTM C 28 (Gold Bond® Gypsolite® Plaster).

2. Finish Plaster: Gypsum plaster for smooth finish complying with ASTM C 587 (Gold Bond® Kal-Kote® Smooth Finish Plaster).

F. Sand: ASTM C 35.

G. Water: Potable.

2.03 ACCESSORIES

A. Corner Bead: Formed steel nose with 2-1/2 in. expanded metal flanges, weighing 200 lbs. per 1000 lin. ft. with min. base steel of 0.0179 in., galvanized.

B. Corner Bead: Formed steel nose with 3/4 in. radius and 2-1/2 in. expanded metal flanges, weighing 350 lbs. per 1000 lin. ft., galvanized.

C. Corner Bead: Formed steel nose with 3-3/16 in. reinforced expanded metal flanges, weighing 241 lbs. per 1000 lin. ft.

D. Casing Bead: J shaped zinc bead with expanded metal flange for 1/2 in. and 3/4 in. grounds, weighing 200 lbs. and 220 lbs. per 1000 lin. ft.

E. Expansion Joints: W shaped zinc joint with splayed expanded metal flanges for 1/2 in., 3/4 in. and 7/8 in. grounds, weighing 232 lbs. and 285 lbs. per 1000 lin. ft., galvanized.

F. Expansion Joints: Two piece formed zinc joint with slipped connection for 1/2 in., 3/4 in. and 7/8 in. grounds, galvanized.

G. Beam Furring Clip: Spring steel wire clip to fit beam flanges from 1/4 in. to 1 in. thick.

H. Tie Wire: Manufacturer's standard soft, annealed steel protected by Class 1 zinc coating and manufactured in accordance with ASTM A 641.

I. Fasteners:

1. Nails: As recommended by the manufacturer.

2. Screws: ASTM C 954 or ASTM C 1002 or both with heads, threads, points, and finish as recommended by the manufacturer.

2.04 MIXES

A. Proportions and Procedures: In accordance with ASTM C 842 and the manufacturer's recommendations.

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. Examine all surfaces to be plastered before starting any work and ascertain any discrepancy or conditions that may affect or prevent production of a satisfactory job in plastering.

3.02 INSTALLATION

A. In accordance with the following ASTM Standards and manufacturer's recommendations:

1. ASTM Standards:

a. Metal Lath, Gypsum Lath, and Accessories: C 841.

b. Gypsum Plaster: C 842.

B. Tolerances: For flatness of surface, do not exceed 1/4 in. in 8 ft. for bow or warp of surface and for plumb and level.

C. Number of Coats: Apply gypsum plaster, of composition indicated, to comply with the following requirements:

1. Use three-coat work over the following plaster bases:

a. Metal Lath

2. Use two-coat work over the following bases.

a. Unit Masonry

D. Finish Coats: Apply finish coats to comply with the following requirements:

1. Troweled finish for gypsum finish coat plasters, unless otherwise indicated.

E. Cornerbeads: Furnish and install corner beads on horizontal and vertical external corners in plastered surfaces.

1. Install corner beads 12 feet and under in length in one piece. Set plumb or level as required flush with finished plaster and fasten securely along each wing at intervals at 6 inches in a manner not dependent on the plastering.

F. Casing Beads: Furnish and install casing beads as required and as follows:

1. Install at terminations of plasterwork, except were plaster passes behind and is concealed by other work and where metal screeds, bases or frames act as casing beads.

2. Install casing beads 10 feet and under in length in one piece. Set plumb or level as required flush with finished plaster and fasten securely at intervals of 6" in a manner not dependent on the plastering.

G. Control Joints: Install control joints as locations indicated on Drawings, with spacing between joints in either direction not exceeding the following and in specific locations approved by the Architect for visual purposes:

1. Partitions: 30 feet

2. Ceilings: 30 feet

H. Plastering:

1. Surfaces to receive plaster shall be clean and free from loose material and all foreign or objectionable matter. The installation of any plaster will be construed as acceptance of the

surfaces or work to receive plaster, and the Contractor shall be responsible for any subsequent discoloration of plaster by rust or cleaning or plaster from contiguous work that may be required. The Contractor shall therefore ensure the protection of all fixtures, frames, inserts, and other metal against rust or soiling as the result of plastering operations.

2. Plaster work shall be installed in a two (2) coat application: brown coat and finish coat for an overall ½" to 5/8" thick plaster coat or a three (3) coat application: scratch coat, brown coat, and finish coat for an overall 5/8" thick plaster coat. The specified finish coat shall be laid out so as to permit the completion of an entire panel in one operation to avoid unsightly jointing. Particular attention shall be given to the curing requirements described in the referenced standards.

3. All internal vertical and horizontal masonry corners to be plastered including connections to the existing plaster surfaces shall be continuously reinforced with corner lath. All external corners shall be protected with corner beads. Continuous strip lath shall be installed at the junction of dissimilar materials to be plasters. Reinforce corners of openings in block walls with diagonal strip lath.

3.03 PROTECTION, CLEANING, AND PATCHING

A. Protect fixtures, frames, inserts, and other metal against rust or soiling as the result of plastering operations. Provide temporary closures for openings in rooms to be plastered.

B. Protect plaster against freezing, premature drying, damage, marking, marring, or other defacing. Avoid soiling or spattering plaster on other parts of the building construction. Plaster on surfaces which are not required to be plastered shall be removed. Clean floors of plaster and debris, and leave broom clean.

C. Cutting, patching, repairing, and pointing up due to construction operations shall be thoroughly and neatly performed. Cutting, reinforcing and fitting around outlets, piping fittings, conduit, ducts, and other items extending through furred and lathed surfaces shall be provided as required. Cracks and indentations in plastered surfaces shall be thoroughly raked out or cut out, the surfaces around fixtures, outlet boxes, switch plates, fitting, piping, tile, and other materials or appliances abutting or extending into plaster shall be pointed-up and finished flush with the adjacent plaster. Where plaster shall be beveled to a plane so that the joint assumes approximately a 45-degree angle.

3.04 GUARANTEE

A. Work showing any defects within the guarantee period covered by Contract Documents shall be corrected as directed by the Architect. These shall include, but are not limited to, the following:

1. Cracking.

2. Discoloration.

3. Dusting, disintegration, or defective adhesion to masonry or undercoats.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 092900 – GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

B. Provide all labor, materials, equipment, and services and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein, including, but not necessarily limited to, the following:

1. Light gauge interior metal drywall studs for partitions and bulkhead framing.
2. Gypsum wallboard as specified, anchorages and control joints.
3. All trim, battens, corners, and similar items.
4. All required fastenings, framing, and attachments.
5. All adhesive, tapes, and joint compound systems as required.
6. Wall to wall corner expansion joints.
7. Metal drywall ceiling framing, furring and accessories.
8. Acoustical insulation and sealants.

C. Products installed but furnished under other sections and trades:

1. Metal drywall suspended ceiling grid system.
2. Metal wall/ceiling access panels furnished by other trades, as appropriate to project.
3. Metal lighting fixture plaster frames and rings, etc., within gypsum board ceiling system.
4. Cementitious backer units: Section 093013 – Porcelain and Glazed Ceramic Tile.

1.02 RELATED WORK

A. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 054000 – Cold Metal Framing
2. Section 061000 – Rough Carpentry
3. Section 079200 – Joint Sealants
4. Section 081113 – Hollow Metal Doors and Frames
5. Section 081416 – Flush Wood Doors
6. Section 093013 – Porcelain and Glazed Ceramic Tile: for cementitious backer units.
7. Section 099000 – Painting
8. Section 265100 – Interior Lighting: ceiling lighting fixtures with plaster frames and/or rings for recessing fixtures in gypsum board ceiling systems.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. ASTM A525 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
2. ASTM A641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A645 – Standard for Nonstructural Framing Members.
4. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated, (Galvanized) by the Hot-Dipped Process.

5. ASTM C442 – Standard Specification for Gypsum Backing Board, Gypsum Coreboard and Gypsum Shaftliner Board.
6. ASTM C473 – Standard Test Methods for Physical Testing of Gypsum Panel Products.
7. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
8. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
9. ASTM C635 – Standard Specifications for Metal Suspension Systems.
10. ASTM C636 – Recommended Practice for Installation of Metal Suspension Systems.
11. ASTM C645 – Standard Specification for Non-Bearing (Axial) Steel Studs, Runners, (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
12. ASTM C665 – Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
13. ASTM C754 – Specification for Installation of Steel framing Members to Receive Screw-Attach Gypsum Boards.
14. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.
15. ASTM C955 – Standard Specification for Cold-Formed Steel Structural Framing Members.
16. ASTM C1002 – Steel Drill Screws for the Application of Gypsum Board.
17. ASTM C1047 – Accessories for Gypsum Wallboard and Gypsum Veneer Base.
18. ASTM C1178 – Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
19. ASTM C1278 – Standard Specification for Fiber-Reinforced Gypsum Panels.
20. ASTM C1396 – Standard Specification for Gypsum Board.
21. ASTM C1629, Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
22. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
23. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
24. ASTM E136 – Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750º C.
25. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
26. ASTM F1267 – Specification for Metal, Expanded, Steel.

B. Gypsum Association (GA):

1. GA-214 – Recommended Levels of Gypsum Board Finish.
2. GA-216 – Recommended Specifications for the Application and Finishing of Gypsum Board.
3. GA-600 – Fire Resistance and Sound Control Design Manual.
4. GA-801 – Handling and Storage of Gypsum Panel Products.

C. Underwriters Laboratory, Inc. (UL):

1. UL US-22 – Wallboard, Gypsum.
2. UL 40-U18 – Fire Resistance Classification.

D. Steel Structures Painting Council (SSPC):

1. SSPC – Painting Manual.

1.04 QUALITY ASSURANCE

A. To assure compatibility, studs, runner track, clips, etc. shall be the product of the same manufacturer.

B. Comply with the minimum requirements of the following except where more stringent requirements are specified herein. All gypsum wallboard shall be asbestos free.

1. Gypsum Wallboard: ASTM C-1396.
2. Joint Treatment: ASTM C-475.
3. Non-load bearing steel studs, runners, and rigid furring channels for screw attachment of gypsum wallboard: ASTM C-645.

C. Perform work in accordance with ASTM C754, ASTM C840 and GA-216.

D. Maintain copies of GA-216 documents on site.

E. When fire-resistive construction is detailed or noted on the Contract Drawings, perform work in accordance with GA-600.

1.05 QUALIFICATIONS

A. Erector Qualifications: Company specializing in the erection of metal stud framing and gypsum wallboard systems on at least three (3) acceptable projects equal in scope to work specified.

1.06 SUBMITTALS

A. Shop Drawings, Product Data and Samples: Shall be submitted in accordance with Division 01.

B. Shop Drawings: Indicate all special details associated with fireproofing, acoustical seals, and ceiling and bulkhead framing.

C. Product Data: Provide manufacturer’s descriptive literature on metal framing, gypsum board, joint tape, and installation instructions and procedures.

D. Manufacturer’s verification that gypsum wallboard contains 100% post-consumer and post-industrial recycled content.

E. Manufacturer’s verification that VOC content of interior sealants is less than 250 g/L.

F. Manufacturer’s verification that VOC content of gypsum wallboard adhesive is less than 50 g/L.

G. Manufacturer’s verification that steel studs and framing contain at least 35% combined post-consumer and post-industrial recycled content.

H. Samples:

1. Submit samples for the Architect's approval in accordance with the applicable provisions of the contract documents.
2. Submit three (3) samples of each of the following:

    a. Gypsum wallboard: 12" by 12" each type and finish.
    b. Trim: 6" lengths of each type and finish.
    c. Compound: 1 pint cans.
    d. Tape: 12" lengths.
    e. Screws and fastenings: Each size and type.
    f. Submit shop drawings and engineering calculations for special areas as requested by the Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions, GA-216 and GA-801. Stack product flat on a level surface. As individual sheets are removed for installation, raise products carefully on edge and carry in a vertical position. Take care to avoid impact, undue flexing and damage to edges, ends and corners.

B. Deliver all materials in unopened, original containers bearing manufacturer's labels. Store materials in a clean, dry, protected place and do not leave exposed to weather. Handle all materials with proper care to prevent damage. Handle and protect all materials and metal accessories from damage, dampness or wetting.

C. Remove all items delivered in broken, damaged, rusted or unlabeled condition from site immediately.

D. Storage:

1. Store all materials inside under cover, providing protection from damage and exposure to the elements, stacked flat, and off-floor.
2. Stack wallboard so that lengths are not over short lengths, avoid overloading floor system.
3. Store adhesives and ready-mixed joint compound in dry area; provide protection against freezing at all times.
4. Damaged, frozen, and deteriorated materials shall be removed from the job site.

1.08 JOB CONDITIONS

A. Environmental Conditions:

1. Temperature: During cold weather, in areas receiving wallboard installation and joint finishing, maintain temperature range between 55° to 70° F for one week prior to attachment or joint treatment, and until joint treatment is complete and dry.
2. Do not install gypsum board when ambient temperature is below 40°F.

B. Ventilation:

1. Provide adequate ventilation to carry off excess moisture during and following adhesive and joint compound treatment applications.
2. Use temporary air circulators in enclosed areas lacking natural ventilation. Under slow drying conditions, allow additional drying time between coats of joint treatment.
3. Protect installed materials from drafts during hot, dry weather.
4. Protection: Protect adjacent surfaces against damage and stains.

1.09 COORDINATION WITH OTHER WORK

A. General:

1. Coordinate with other work including mechanical and electrical work and partition systems. Installation of conduit and ductwork above suspension system shall be complete before installation of suspension system.

B. Protection:

1. Follow good safety and industrial hygiene practices during handling and installation of all products and systems, with personnel to take necessary precautions and wear appropriate personal protective equipment as needed. Read Material Safety Data Sheets and related literature for important information on products before installation. Contractor to be solely responsible for all personal safety issues during and subsequent to installation; architect, specifier, owner and manufacturer will rely on contractor’s performance in such regard.

PART 2 - PRODUCTS

2.01 METAL FRAMING MATERIALS

A. Provide metal wall and bulkhead framing materials in accordance with GA 216.

B. Metal Studs - Drywall Type: ASTM C645: non-load bearing, galvanized sheet steel, ASTM A525; Cee-shaped, size as indicated on the drawings or noted below, conforming to the following:

1. Rated/non-rated, non-bearing metal stud partitions with single/double layer drywall: 20 gauge (up to 11 feet-6 inches in height; 18 gauge over 11'-6" in height.
2. Rated/non-rated, load bearing metal stud partition with single/double layer drywall: 20 gauge.
3. Ceiling and Wall Furring Channels: 1-3/8" face x 7/8" deep as manufactured by USG Corporation or approved equal. "Z" furring channels, 26 gauge hot dipped galvanized, 1-1/2" deep as manufactured by USG Corporation or approved equal.
4. Metal stud partitions with gypsum board/tile backerboard and ceramic tile finish: 20 gauge or heavier.
5. Metal stud framing at hollow metal door and light openings: 20 gauge.
6. Metal studs for infill framing at renovation/alteration areas: 25 gauge. Runners: Of same material and thickness as studs, bent leg retainer notched to receive studs.

C. Ceiling Runner: Where required, provide with extended leg retainer. Furring, Bridging and Bracing: Of same material as studs; thickness to suit purpose. Sheet Metal Backing: 20 gauge thickness, galvanized steel.

D. Fasteners: GA-216.

E. Touch-Up Primer for Galvanized Surfaces: SSPC SP 20, zinc rich.

F. Anchorage to Substrate: Tie wire, screws, nails and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.02 CEILING FRAMING

A. Channels: Fabricated of 16 gauge (1.5 mm) cold-rolled steel, factory applied black asphaltum rust-resistant paint. Minimum weight per 1,000 lineal feet:

1. Depth: 2 inches, 590 lbs.
2. Depth: 1 1/2-inches, 300 lbs.

B. Furring Channels: Screw-type, hat-shaped, 25 gauge (0.5 mm)

C. Optional Framing: Metal stud, ASTM C645 and GA 216, galvanized sheet steel, screw-type, Cee-shaped, minimum 25 gauge.

D. Ceiling Hangers: Minimum 8 gauge, galvanized, annealed steel wire.

E. Tie Wire: 16 gauge, galvanized, annealed steel wire.

F. Anchorage to Substrate: Tie wire, screws, nails and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.03 SUSPENDED GYPSUM BOARD CEILING GRID SYSTEM

A. USG Drywall Suspension Systems – Commercial quality, cold-rolled steel, hot dipped galvanized finish.

1. Main Tees: Fire-Rated Heavy-Duty classification 1.617” high x 144” long, integral reversible splice with knurled face. (DGLW-26 1-1/2” Face and 1.617” high)

    a. Cross Members: Fire-Rated members with knurled face. Cross Tees: DGLW-424 cross tee 1-1/2” high x 48” long with 1-1/2” wide face; DGLW-224 Fire-Rated: 1-1/2” high x 24” long with 1-1/2” face.

2. Quick release cross tee ends for positive locking and removability without tools.

3. Accessory Cross Tees: Cross tees must have knurled faces and quick release cross tee ends for positive locking and removability without tools.

    a. DGW-6026DM: 1.617” high x 5’ long with a 1-1/2” face
    b. DGW-7226DM: 1.617” high x 6’ long with a 1-1/2” face
    c. DGW-8426DM: 1.617” high x 7’ long with a 1-1/2” face
    d. DGW-9626DM: 1.617” high x 8’ long with a 1-1/2” face

4. Wall Moldings: Single web with knurled face

    a. DGWM-24: 1-1/2” x 1” x 144” long wall molding
    b. DGCM-27: 144” x 1-5/8” x 1” x 1” channel molding
    c. DGLC-12: 144” x 1-3/4” x 1” x 1” index channel molding

5. Accessories

    a. DGSC-180: Splice Clip
    b. DGTC-90: Transition Clip
    c. DGWC: Wall Attachment Clip
    d. DGSP-180: Splice Plate
    e. DGHUB: Dome Hub
    f. CMAC-1: Close Mount Attachment Clip

6. Wire: Hanger Wire 12 ga., galvanized or as noted on drawings

B. USG Drywall Wall-to-Wall Suspension Systems – Commercial quality, cold-rolled steel, hot dipped galvanized finish for use in corridors and short span applications.

1. Main Tees: Fire-Rated Heavy Duty classification 1.617” high x 6’, 8’, 10’, 12’, 14’ or Custom long, integral reversible splice with 1-1/2” knurled face.
2. Wall Moldings: Single web with knurled face, 1-1/2” x 1” x 12’ long, DGWM24
3. Wall Channel: Single web with knurled face, 1-5/8” x 1” x 12’ long, DGCM27
4. Locking Wall Channel: Single web with knurled face, 1-3/4” x 1” x 12’ long, DGLC-12

C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL or architect approved equal.

2.04 MANUFACTURERS – GYPSUM BOARD

A. Subject to compliance with requirements, provide products by one of the following:

1. USG Corporation
2. Gold Bond Building Products
3. Lafarge
4. Georgia-Pacific Co.

B. Limitations:

1. Do not expose to sustained temperatures exceeding 125º F.
2. Do not expose to excessive, repetitive or continuous moisture before, during or after installation. Eliminate sources of moisture immediately.
3. Not suitable for use in high-moisture areas such as tub and shower enclosures, gang showers and other areas subject to direct water exposure.
4. Non-loadbearing.
5. For abuse-resistant construction over steel framing, minimum 20-gauge studs at a maximum of 16” on center are required.
6. Application of Sheetrock Mold Tough AR gypsum panels over insulating blanket, installed continuously across the framing members is not recommended. Blankets should be recessed and blanket flanges attached to sides of studs or joists.

C. Finishing and Decorating:

1. Painting products and systems should be used that comply with recommendations and requirements in Appendices of ASTM C-840. For priming and decorating with paint, texture or wall covering, follow those manufacturer’s directions for materials used.

2. All surfaces, including applied joint compound, must be thoroughly dry, dust-free and not glossy. Prime with Sheetrock brand First Coat primer, or with an undiluted, interior latex flat paint with high-solids content. Allow to dry thoroughly before decorating.

3. To improve fastener concealment, where gypsum panel walls and ceilings will be subjected to severe artificial or natural side lighting and be decorated with a gloss paint (eggshell, semi-gloss or gloss), the gypsum panel surface should be skim-coated with joint compound. This equalizes suction and texture differences between the drywall face paper and the finished joint compound before painting. As an alternative to skim coating, or when a Level 5 finish is required, use manufacturer’s Tuff Hide primer-surfacer.

D. Fire Protection:

1. 5/8” panels are UL Classified. Provide one- and two-hour Fire Ratings when used in accordance with UL designs U420, U442, U445, U451, U465, U466, U467 and U468. The gypsum core meets requirements for noncombustible construction.

2.05 GYPSUM PANEL PRODUCTS

TYPE I – ABUSE - MOISTURE - AND MOLD-RESISTANT TYPE X GYPSUM PANEL

To be used at all rated and non-rated interior gypsum board partitions and rated ceiling assemblies.

A. ASTM C1396, Standard Specification for Gypsum Board, for 5/8 in., Type X and water-resistant gypsum wallboard.

B. Basis of Design: Subject to compliance with project requirements, the design is based on the following: United States Gypsum Company, USG Sheetrock® Brand Mold Tough® AR Firecode® X Panels.

1. UL Type Designation: “AR”.

2. ASTM E136 Noncombustibility.

3. Meets the following ASTM E84 Surface-Burning Characteristics.

a. Flame Spread: 15
b. Smoke Developed: 5
c. Class A

4. Meets the following ASTM C473, Standard Test Methods for Physical Testing of Gypsum Panels Products.

    a. Core Hardness
        1) Field - Not less than 11 lbf
        2) End - Not less than 11 lbf
        3) Edge - Not less than 11 lbf

    b. Flexural Strength
        1) Parallel - Not less than 46 lbf
        2) Perpendicular - Not less than 147 lbf

    c. Nail Pull Resistance - Not less than 87 lbf
    d. Humidified Deflection - Not greater than 5/8 in.
    e. Average Water Absorption - Not greater than 5% by weight after two-hour immersion

5. ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber. Meets ASTM C1396 specifications.

6. Thickness: 5/8 in.

7. Length: 8-12 ft.

8. Width: 4 ft.

9. Weight: 2.8 lb./sq. ft.

10. Edge: Tapered

C. ASTM C1629, Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

    1. Abrasion Resistance per ASTM D4977: Level 2
    2. Indentation Resistance per ASTM D5240: Level 1
    3. Soft-Body Impact Resistance per ASTM C1629: Level 2
    4. Hard-Body Impact Resistance per ASTM C1629: Level 1

TYPE IA – HIGH – ABUSE – MOISTURE - AND MOLD-RESISTANT TYPE X GYPSUM PANEL

To be used at all rated and non-rated interior gypsum board partitions requiring High Impact wall Assemblies as noted on the Drawings.

A. ASTM C1396, Standard Specification for Gypsum Board, for 5/8 in., Type X and water-resistant gypsum wallboard.

B. Basis of Design: Subject to compliance with project requirements, the design is based on the following: United States Gypsum Company, USG Sheetrock® Brand Mold Tough® VHI Firecode® X Panels.

    1. UL Type Designation: “AR”.

    2. ASTM E136 Noncombustibility.

    3. Meets the following ASTM E84 Surface-Burning Characteristics.

        a. Flame Spread: 15
        b. Smoke Developed: 5

c. Class A

4. Meets the following ASTM C473, Standard Test Methods for Physical Testing of Gypsum Panels Products.

   a. Core Hardness
      1) Field - Not less than 11 lbf
      2) End - Not less than 11 lbf
      3) Edge - Not less than 11 lbf

   b. Flexural Strength
      1) Parallel - Not less than 46 lbf
      2) Perpendicular - Not less than 147 lbf

   c. Nail Pull Resistance - Not less than 87 lbf
   d. Humidified Deflection - Not greater than 5/8 in.
   e. Average Water Absorption - Not greater than 5% by weight after two-hour immersion

5. ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber. Meets ASTM C1396 specifications.

6. Thickness: 5/8 in.

7. Length: 8-12 ft.

8. Width: 4 ft.

9. Weight: 2.8 lb./sq. ft.

10. Edge: Tapered

C. ASTM C1629, Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

   1. Abrasion Resistance per ASTM D4977: Level 2
   2. Indentation Resistance per ASTM D5240: Level 2
   3. Soft-Body Impact Resistance per ASTM C1629: Level 3
   4. Hard-Body Impact Resistance per ASTM C1629: Level 3

TYPE II – GLASS-MAT TILE BACKERBOARD

To be used at all wall surfaces scheduled to receive wall tile finishes.

A. ASTM C1178, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel, for 5/8” in., Glass-Mat Tile Backerboard.

   1. Basis of Design: Subject to compliance with project requirements, the design is based on the following: USG Durock™ Glass-Mat Tile Backerboard.

      a. Thickness: 5/8 inch.

      b. Board Length: 8 feet.

      c. Board Width: 48 inches.

      d. Mold Resistance: ASTM D 3273, score of 10.

2. Fastener Requirements: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and application.

    a. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: DUROCK Tile Backer Screws 1-5/8 inch.
    b. Wood Screws: DUROCK Tile Backer Screws for wood framing 1-5/8 inch.

3. Panel Installation Requirements:

    a. Install backerboard with ends and edges closely abutted but not forced together. Stagger end joints in successive courses.

    b. For flooring applications over a wood-based substrate, laminate USG Durock™ Glass-Mat Tile Backerboard to subfloor using Type 1 organic adhesive or latex-modified thin-set mortar suitable for bonding cement board. Fasten to subfloor with 1-1/4" USG Durock™ Brand Tile Backer Screws for wood framing (or equivalent) spaced 8" o.c. in both directions with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges. Drive screws so bottoms of heads are flush with panel surface to ensure firm panel contact with subfloor. Do not overdrive fasteners. Prefill joints with tilesetting mortar or adhesive and then immediately embed USG Durock™ Brand Tile Backer Tape and level joints.

    c. For wall application, fasten USG Durock™ Glass-Mat Tile Backerboard to framing with specified fasteners. Drive fasteners into field of panels first, working toward ends and edges. Hold panels in firm contact with framing while driving fasteners. Space fasteners maximum 8" o.c. for walls, 6" o.c. for ceilings, with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges. Drive screws so bottoms of heads are flush with panel surface. Do not overdrive fasteners. Approved fasteners include: USG Durock™ Tile Backer Screws for steel framing (or equivalent), 1-5/8" for 14- to 20-gauge steel framing; USG Durock™ Tile Backer Screws for wood framing (or equivalent), 1-5/8" for wood framing. Prefill joints and then immediately embed USG Durock™ Tile Backer Tape and level joints. Maintain 1/4" gap between USG Durock™ Glass-Mat Tile Backerboard and tub surround.

    d. Panels should be cut to size with a knife and straight edge. A power saw should be used only if it is equipped with a dust-collection device. Installer should wear NIOSH/MSHA-approved dust mask.

    e. If waterproofing is required, treat joints and fastener penetrations with USG Durock™ Brand Waterproofing Membrane or equivalent ANSI A118.10 waterproofing membrane. Refer to the current USG Durock™ Brand Waterproofing Membrane submittal sheet (CB595) or waterproofing membrane manufacturer's installation recommendations. For technical assistance, call USG Technical Service at 800 874-4968.

    f. In areas where standing water could occur on horizontal surfaces, such as shower benches or niches, waterproofing is required with USG Durock™ Waterproofing Membrane or equivalent ANSI A118.10 waterproofing membrane. Refer to the current USG Durock™ Brand Waterproofing Membrane submittal sheet (CB595) or waterproofing membrane manufacturer's installation recommendations.

4. Application Limitations:

    a. Tile must be applied on the gray-coated side of panel. Panels are designed for interior use only and should not be used around fireplaces or areas where prolonged exposure to heat exceeds 125°F (52°C) or for exterior applications. Use framing or furring when applying over concrete or masonry block. Install vapor retarders suitable for bonding tiles on the face of the panels.

b. For wall applications, maximum stud spacing: 16" o.c. (24" o.c. for cavity shaft wall assembly). Framing shall be designed (based on stud properties alone) not to exceed L/360 deflection for tile and thin brick. Maximum fastener spacing: 8" o.c. for wood and steel framing; 6" o.c. for ceiling applications.

c. Floor applications, maximum joist spacing 24" o.c. The subfloor system should be designed with a maximum deflection limit of L/360 for the span. Some finish materials may require a more rigid subassembly (such as large format tile and natural stone products). In these cases, follow the manufacturer's minimum requirements. The subfloor shall be APA Span-Rated Plywood or OSB with an Exposure 1 classification or better with tongue and groove or back blocked at the unsupported edges.

d. Ceiling maximum dead load 7.5 psf.

e. Steel framing must be 20-gauge equivalent or heavier.

f. Consult manufacturers information on finishing limitations.

1) Do not use drywall screws or drywall nails.
2) Do not use drywall joint tape.
3) Do not use with vinyl flooring or over a concrete subfloor.

g. USG Durock™ Glass-Mat Tile Backerboard is not designed for use as a structural panel.

h. Panels should not be used in select wet areas including commercial saunas or steam rooms, gang showers, or shower pan bases.

i. Waterproofing membrane must be used over USG Durock™ Glass-Mat Tile Backerboard in select wet areas including indoor hot tub decks, shower benches and niches, tiled wall and ceiling applications in indoor pool areas, and tiled wall and ceiling applications in residential steam rooms, per ANSI A118.10.

TYPE III – MOISTURE- AND MOLD-RESISTANT TYPE X GYPSUM SHAFTLINER PANEL

To be used at all rated and non-rated interior gypsum board shaft wall and area separation wall systems.

A. ASTM C1396, Standard Specification for Gypsum Board, for 1 in., Type X and water-resistant shaftliner board.

B. Basis of Design: Subject to compliance with project requirements, the design is based on the following: United States Gypsum Company, USG Sheetrock® Brand Mold Tough® Gypsum Liner Panels.

1. UL Type Designation: “SLX”.

2. ASTM E136 Noncombustibility.

3. Meets the following ASTM E84 Surface-Burning Characteristics.

a. Flame Spread: 20
b. Smoke Developed: 0
c. Class A

4. Meets the following ASTM C473, Standard Test Methods for Physical Testing of Gypsum Panels Products.

a. Core Hardness

1) Field - Not less than 11 lbf
2) End - Not less than 11 lbf
3) Edge - Not less than 11 lbf

b. Flexural Strength
1) Parallel - Not less than 77 lbf
2) Perpendicular - Not less than 228 lbf

c. Nail Pull Resistance - (Not Required)
d. Humidified Deflection - (Not Required)
e. Average Water Absorption - Not greater than 5% by weight after two-hour immersion

5. ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber. Meets ASTM C1396 specifications.

6. Thickness: 1 in.

7. Length: 8 ft., 10 ft. 12 ft.

8. Width: 2 ft.

9. Weight: 4.0 lb./sq. ft.

10. Edge: Double-beveled

TYPE IV – LIGHTWEIGHT MOISTURE - AND MOLD-RESISTANT GYPSUM PANEL
To be used at all non-rated ceilings and soffits.

A. ASTM C1396, Standard Specification for Gypsum Board, for 1/2 in., water-resistant gypsum wallboard.

B. Basis of Design: Subject to compliance with project requirements, the design is based on the following: United States Gypsum Company, USG Sheetrock® Brand UltraLight Panels Mold Tough®.

1. UL Type Designation: Not applicable

2. ASTM E136 Noncombustibility.

3. Meets the following ASTM E84 Surface-Burning Characteristics.

a. Flame Spread: 15
b. Smoke Developed: 0
c. Class A

4. Meets the following ASTM C473, Standard Test Methods for Physical Testing of Gypsum Panels Products.

a. Core Hardness
1) Field - Not less than 11 lbf
2) End - Not less than 11 lbf
3) Edge - Not less than 11 lbf

b. Flexural Strength
1) Parallel - Not less than 36 lbf
2) Perpendicular - Not less than 107 lbf

c. Nail Pull Resistance - Not less than 77 lbf
d. Humidified Deflection - Not greater than 1-1/4 in.
e. Average Water Absorption - Not greater than 5% by weight after two-hour immersion

5. ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber. Meets ASTM C1396 specifications.

6. Thickness: 1/2 in.

7. Length: 8-12 ft.

8. Width: 4 ft.

9. Weight: 1.35 lb./sq. ft.

10. Edge: Tapered

2.06 GYPSUM BOARD ACCESSORIES

A. Provide gypsum wallboard accessories in accordance with GA 216.

B. Each interior sealant and adhesive product must meet the VOC limits specified in Section 013563 "*LEED Requirements*".

C. Fasteners: Screws ASTM C1002, self-drilling, self-tapping, Bugle Head, for use with power driven tool.

1. Type "S": for wallboard application to sheet metal framing

2. Type "W": for wallboard application to wood framing.

3. Length:

a. 1 inch (25 mm) for single layer construction.
b. 1 5/8-inches (41 mm) for double layer construction.

4. For Fire Rated Construction: Same type and size as used in fire rating test.

5. For Other Applications: Type and size as recommended by gypsum board manufacturer.

D. Metal Trim Accessories: Size required for thickness of wallboard used, fabricated from galvanized steel and roll-formed zinc, or other corrosion-resistant treatment. All metal trim shall be 25 gauge, manufactured by *USG Corporation* under the following numbers or approved equal:

1. Corner Beads: Formed galvanized steel angle, 1/8-inch round bead, 1-1/4-inch perforated metal flanges, ASTM C1047, similar or equal to *"Dura-Bead"*.

2. Edge Trim: Formed galvanized steel casing bead, 0.014-inch-thick base steel, face nailed, reveal bead and exposed metal flange surface finished with joint compound, ASTM C1047.

3. Control Joints: Manufacturer's standard roll-formed zinc with 1/4-inch; "V"-shaped slot protected by plastic tape, for face application, exposed flange surfaces finished with joint compound, ASTM C1047; similar or equal to No. 093.

4. Casings: No. 400.

5. Wall to Wall (corner) Expansion Joints: *Wabo ECC-200* corner coverplate, aluminum alloy 6063-TS or 6061-T6, mill finish. Paint as per Section 099000.

E. Joint Treatment Materials:

1. Joint Tape: ASTM C475; paper reinforcing tape, perforated.

2. Joint Compound: ASTM C475; drying type pre-mixed vinyl base compounds, as manufactured by the approved manufacturer of the gypsum board.

3. Laminating Adhesive: Manufacturer's recommended laminating adhesive or liquid contact adhesive for double-layer systems.

F. Adhesive: Similar or equal to USG Durabond 90.

G. Adhesive VOC content must be less than 50 g/L.

H. Special Architectural Metal Drywall Profiles: Furnish and install, where indicated on Contract Drawings, extruded and roll-formed Architectural profiles *"Softforms"* as manufactured by *Pittcon Industries, Inc*., Riverdale, MD. Subject to compliance with requirements, provide the named product or a comparable product.

1. Designs:

a. Corners: Custom Inside Corner, Model #SI-LRt, 6-inch inside radius by 90 degrees.
b. Reveals: Wall Reveal, Model #SWR-200-050, 2-inch wide by 15/32-inch deep.
c. Grooves: V-Groove, Model #SWR-100V-050, 1-inch wide by 45 degrees.

2. Material: Extrusions shall be of 6063 T5 aluminum alloy, and roll formed shapes shall be of 3003 H-14 aluminum alloy.

3. Construction: Profile shall incorporate continuous integral tapering fins for surface contact, 7/8-inch wide. Fins shall be punched with ¼-inch holes staggered ½-inch o.c. to accept standard screw fastening.

4. Finish: Profiles shall receive a factory-applied, high porosity, corrosion-resistant primer compatible with materials commonly in use in conjunction with commercial interiors, i.e. – joint compound, latex or enamel paints, and wall covering adhesives.

2.07 ACOUSTICAL ACCESSORIES

A. Sound Attenuation Fire Blankets:

1. Manufactured from slag wool fiber.

2. Unfaced batts in manufacturers' standard thickness to fit cavity in compliance with manufacturers Sound and Fire-Rated SAFB Assemblies.

3. Length: 48 inches.

4. Batts shall have a density of 2.5 lbs. per cu.ft.

5. R-Value, per 1-inch thickness: 3.7.

6. Flame Spread and Smoke Developed (ASTM E84, Surface Burning Characteristics): 0.

B. Basis-of-Design Product: The design for Slag Wool Fiber is based on *Thermafiber, Sound Attenuation Fire Blankets* (SAFB). Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Owens Corning.
2. Fibrex Insulations, Inc.

C. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board; type as recommended by gypsum manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on Contract Drawings and approved shop drawings.

3.02 METAL STUD INSTALLATION - GENERAL

A. Install metal stud framing in accordance with manufacturer's instructions, and ASTM C754, except as otherwise specified herein.

B. Install members true to lines and levels to provide surface flatness with maximum variation of 1/8-inch in 10 feet in any direction.

C. Align all partitions accurately according to layout. Runners shall be attached to concrete slab or other type of floor 24 inches on center with concrete stub nails or power-driven anchors, to suspended ceilings with toggle bolts, or to slab above where indicated.

D. Position studs vertically in runners, spaced 16 inches on center maximum.

E. Anchor all studs adjacent to door frames and at partition intersections and corners, to runner flanges with metal lock fasteners, or positive screw engagement through each stud and runner flange.

F. When necessary, studs shall be spliced by nesting 2 studs with a minimum lap of 8 inches, attaching flanges with 2 screws per flange.

G. Provide horizontal bracing of studs at mid-point in partition height. Bracing shall be standard metal stud cut to fit and secured to studs.

H. Metal studs at door frames shall be erected 2" maximum from frames and as follows:

1. Anchor door frame clips to studs securely by bolt or screw attachment.
2. Doors 2'-6" and wider shall be framed with double studs, placed back to back.
3. Over door frames, install a section (cut to length) of runner with slip flanges and bent web to allow flanges to overlap adjacent vertical studs; screw attach all components.
4. Position a stud at the locations of vertical joints in wallboard over door frames. Stud shall extend from frame header to the ceiling runner.

I. Unless otherwise indicated or specified, the suspension system for gypsum board ceilings and soffits shall consist of runner channels and furring channels, suspended by hanger bars or hanger rods.

3.03 INSTALLATION OF FLOOR AND CEILING TRACKS

A. Align floor and ceiling tracks.

B. Attach metal runners at floor and ceiling to structural elements with appropriate power-driven fasteners.

C. Attach tracks to structure with fasteners located 2 inches from each end and spaced at a maximum of 24 inches on center.

D. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

3.04 INSTALLATION OF METAL STUD

A. Plumb and align studs.

B. Space studs at 16 inches on center, unless otherwise indicated.

C. Attach studs to floor and ceiling tracks by crimping flange of runner track, screwing, tack welding or method as recommended by stud manufacturer.

D. If necessary, splice studs by nesting with minimum lap of 8 inches.

E. Refer to Contract Drawings for indication of partitions extending to finished ceiling only, and for partitions extending through the ceiling to the structure above.

3.05 INSTALLATION OF FRAMING AROUND DOORS AND LIGHT OPENINGS

A. Install double studs at each jamb of door, continuous for full height of partition.

B. Attach stud track horizontally on each side of opening, at frame head height.

1. Install jack studs at 16 inches on centers over head of door frame.
2. Attach jack studs to runner track and anchor top in same manner as provided for full studs.
3. Screw, bolt or weld stud to jamb anchors of frame, as recommended by stud manufacturer.
4. Anchor a second stud to stud at doorjamb, as recommended in manufacturer's printed instructions, nested to form a box.
5. Provide headers above and below framed wall openings having an area of 2 square feet or more.

3.06 CORNERS AND INTERSECTIONS

A. Form corners and intersection of partitions with three studs as detailed in ASTM C754, Fig. 2 and Fig.3, as detailed on drawings. Two stud corner construction is not acceptable.

B. Place studs forming internal corners 2 inches (50 mm) from point of partition intersections.

3.07 BLOCKING

A. Bolt or screw steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and other similar items.

3.08 INSTALLATION – WALL FURRING

A. Attach wall furring for direct attachment to concrete block and/or concrete walls.

B. Erect furring channels horizontally or vertically; space maximum 16" (400 mm) on center, not more than 4 inches (100 mm) from floor and ceiling lines or abutting walls. Secure in place on alternate channel flanges at maximum 24" on center.

C. Where furring channels are installed directly to exterior walls and a possibility of moisture penetration through walls exists, install asphalt felt paper protection strip between the channel and wall.

3.09 INSTALLATION – CEILING FRAMING

A. Space 8 gauge hanger wire 48" on centers along carrying channels and within 6" of ends of channel run.

B. Install carrying channels 48" on centers and within 6" of walls.

C. Position channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channel.

D. Interlock flanges, at channel splices, and overlap ends 12" and secure each end with double-strand 18 gauge tie wire.

E. Erect metal furring channels at right angles to carrying channels or support members. Space furring channels 16” o.c. and within 6" of walls.

F. Secure furring to carrying channels with clips or saddle-tie with double-strand 16 gauge tie wire.

G. Nest furring channels at least 8" at splices, and securely wire-tie each end with double-strand 18 gauge tie wire.

3.10 INSTALLATION – SUSPENDED CEILING GRID SYSTEM

A. General Installation Requirements:

1. Standard reference: Install grid members in accordance with ASTM C636, CISCA installation standards, and other applicable references.
2. Manufacturer’s reference: Install in accordance with manufacturer’s current printed recommendations.
3. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.
4. Install in accordance with reference standards and manufacturer's instructions and as required to comply with seismic requirements.

B. Flat Ceiling Applications

1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.
2. Space main tee members a maximum span of 48” on center (or as specified by the UL Fire Resistance Directory)
3. Space cross tees recommended 16” o.c. (5/8” SHEETROCK Brand gypsum Board or 5/8” FIBEROCK Interior panels can span 24” o.c. Check USG AC3095, for maximum allowable spacing based on wind load) (or as specified by the UL Fire Resistance Directory) Install extra cross tees where butt joints occur, 8” from each side of the butt joint.
4. Install compression struts per manufacturer’s specifications and spacing, in accordance with wind load if applicable. Adjust main and cross tee spacing as necessary for loading conditions. (See AC3095, USG)

5. Install fiber glass insulation in plenum, resting on top of main tees and cross members, as indicated on the drawings.
6. Do not install insulation within 3” of light fixtures unless fixtures are approved for use with insulation.
7. Limit insulation thickness so that combined weight of supported panels and insulation on grid main tees does not exceed 16 plf.
8. Attach SHEETROCK gypsum Board or FIBEROCK Interior panels to the suspension system main runners, cross tees, and cross channels with 1-1/4” bugle head screws – single layer of board spaced 16” o.c. – SHEETROCK gypsum Board and 8” o.c.- FIBEROCK in the field and at the perimeter of the panels, locate 3/8” in from panel edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads flush with, or slightly below surface.
9. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.
10. Install control joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.
11. Finish boards as described to achieve ‘Level of Finish’ specified.

C. Corridor (Wall-to-Wall) Applications

1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.

    a. Note:
    If using ½” single layer of drywall no hangers are required for spans up to 7’-0” (L/240 uniform load, single span design).
    If using 5/8” single layer of drywall no hangers are required for spans up to 6’-0” (L/240 uniform load, single span design).
    If using ½” single layer of drywall for spans over 7’-0” to 14’-0” one hanger at mid span per each main is required (L/240 uniform load, single span design).
    If using 5/8” single layer of drywall for spans over 6’-0” to 12’-0” one hanger at mid span per each main is required (L/240 uniform load, single span design).
    If using 5/8” single layer of drywall for spans over 12’-0” to 14’-0” two hangers at 1/3 point per each main is required (L/240 uniform load, single span design).

2. Space main tee members as required by span and design load

    a. Note:

Maximum load (lbs/sf)	Unsupported span	Main tee spacing
18	4’-0”	16” o.c.
12	4’-0”	24” o.c.
9.2	5’-0”	16” o.c.
6.1	5’-0”	24” o.c.
5.3	6’-0”	16” o.c.
3.6	6’-0”	24” o.c.
3.4	7’-0”	16” o.c.

3. Attach SHEETROCK gypsum board and FIBEROCK interior panels to the suspension system main runners, cross tees, and cross channels with 1-1/4” bugle head screws – single layer of board spaced 16” o.c. – SHEETROCK gypsum Board and 8” o.c.- FIBEROCK in the field and at the perimeter of the panels, locate 3/8” in from panel edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads flush with, or slightly below surface.

4. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.

5. Install control joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.

6. Finish boards as described to achieve 'Level of Finish' specified.

D. Curved, vaults, or dome applications

1. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.

2. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 12 sq. ft.

   a. Note: Curved surfaces can be achieved with the attachment of panels, however, in order to achieve the best application, plaster is recommended. Due to the width of the grid flange (greater than ¾") STRUCTO-BASE gypsum basecoat plaster should be used to reduce cracking. If other gypsum plasters or portland plaster are being used then it is recommended to secure narrow flanged framing members or offset the metal lath to reduce cracking due to reduced mechanical key at framing/lath intersection. Total weight of ceiling membrane plus overlaid insulation and surface finish material (e.g. ceramic tile) supported by the grid assembly should not exceed 4.0 psf. If the load exceeds 4.0 psf, then spacing of the hanger wires and/or main tees must be reduced (see sample calculation below). For guidance the following are design weights:

1/2" SHEETROCK Exterior Gypsum Ceiling Board	2.0 psf
5/8" SHEETROCK Exterior Gypsum Ceiling Board	2.5 psf
1/2" FIBEROCK Sheathing	2.2 psf
5/8" FIBEROCK Sheathing	3.0 psf

   b. If main tee hanger wires are at 4' o.c., the mains' load capacity is: 4 FT * 4 psf = 16 #/LF.
   By reducing the hanger wires to 3' o.c., the mains can carry 32 #/LF.
   By reducing the hanger wires to 2' o.c., the mains can carry 64 #/LF.

   3/4" of plaster wet would be about 8.75 #/SF + 5/8" FIBEROCK Sheathing at 3 #/SF for about 12 #/SF.

   Mains are at 4 ft centers with 4' hangers; this load would be 12 #/SF * 4 FT = 48 #/LF.
   If the Mains are at 2 ft centers with 4' hangers; this load would be 12 #/SF * 2 FT = 24 #/LF.

   Therefore, there are two options:

   1) Space the main tees at 4' o.c. with the 12 ga. hanger wire at 24" o.c. and within 8" from any wall, cross tees at 16" o.c. with hanger wire support at midspan and/or within 8" from any wall.
   2) Space the main tees at 2' o.c. with the 12 ga. hanger wire at 36" o.c. and within 8" from any wall, cross tees at 16" o.c.

3. Space main and cross tee members so the maximum span of metal lath is (16") (12")

4. Secure self-furring metal lath to tee members with screws spaced 6" o.c. max., applied at lath dimples. Lap metal lath ends and edges and secure with 18 gauge tie wire spaced 6-inches o.c.

5. Mix STRUCTO-BASE Gypsum Plaster with sand in proportions of 2 cu. ft. of sand per 100 lbs. of plaster for scratch and brown coats. Apply plaster to metal lath to a thickness of 5/8” (min.) Measured from the face of the lath.

6. Select a plaster mix for the finish coat to provide a smooth trowel or sand float (textured) finish. (Reference SA 920)

7. Use template(s) to insure uniform and even curvature of the finished surface.

3.11 FURRING FOR FIRE RATINGS

A. Install furring for fire resistance ratings in accordance with appropriate UL requirements and/or Design Numbers indicated.

3.12 INSPECTION PRIOR TO WALLBOARD INSTALLATION

A. Check framing for adequate spacing and alignment.

B. Verify that spacing of installed framing does not exceed maximum allowable for thickness of wallboard to be used.

C. Verify that frames are set for thickness of wallboard to be used.

D. Do not proceed with installation of wallboard until deficiencies are corrected and surface to receive wallboard are acceptable.

E. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of wallboard is started.

F. Commencing installation of wallboard means “acceptance” of existing conditions.

3.13 WALLBOARD INSTALLATION - GENERAL

A. Unless otherwise specified, methods of installation shall be in accordance with the requirements of the Gypsum Association (GA-216) and the approved manufacturer’s instructions.

B. Stockpile wallboard, flat on floor in piles. Leave in original wrappings or containers until ready for use. Protect wallboard from moisture from any source.

C. Butt all wallboard joints loosely together with a 1/4" cap. Butt ends shall not be placed against tapered edges.

D. Install in maximum practical lengths to span walls without butt joints. If butt joints do occur, stagger joints and locate as far as possible from center of walls or ceilings.

E. Abut wallboard without forcing. Neatly fit ends and edges of wallboard. Do not place butt ends against tapered edges.

F. Support end joints on studs. Apply end joint compound to the back of the board along end joints.

G. No end joints shall align with edges of openings. Install expansion and/or control joints where shown or required.

H. Install metal trim at corners, edges, and elsewhere as shown in accordance with the manufacturer's instructions and recommendations.

I. Openings cut in wallboard to fit mechanical and electrical items shall fit snugly and be small enough to be covered by escutcheons and plates. Both face and back paper shall be cut when cutouts are not made with a saw.

J. Adhesive and joint finishing compounds shall be mixed in strict accordance with the manufacturer's instructions. Mix only enough at one time to be used during the recommended pot life of the compound.

K. Fasteners shall be installed as follows:

1. Install no closer than 3/8-inch to end or edge.
2. Begin from center of wallboard and proceed to outer edge.
3. Pressure shall be applied on wallboard adjacent to fasteners being driven to ensure a tight fit of wallboard to the studs.

L. Drive screws with a power screwdriver as recommended by the manufacturer. Surface of head shall finish below the surface of the paper without puncturing the paper.

M. Minimum temperature in areas where gypsum board is to be installed shall be 65°F for 24 hours before, during, and after installation. Provide adequate heat and ventilation to remove any moisture.

N. Install continuous sound absorbing blanket in partitions indicated on drawings. Installation shall be in accordance with manufacturer's directions. Sound absorbing blanket insulation shall be paperless, semi-rigid mineral fiber batts 1" thick "Thermafiber" sound attenuation blanket, flame spread rating of 15 (ASTM E-84) as manufactured by *Owens Corning* or approved equal.

3.14 INSTALLATION - WALLBOARD OVER FRAMING

A. Single Layer Construction:

1. Ceilings:

a. Gypsum wallboard shall be applied first to ceiling with long dimension at right angles to framing using panels of maximum practical length.
b. Position end joints over framing members and stagger in adjacent rows.
c. Fit ends and edges closely, do not force together. Fasten panels to furring with mechanical fasteners, spaced 12” o.c., in field of panels and along abutting ends and edges.

2. Walls:

a. Apply wallboard horizontally for wall height of 8’-0” or less, and vertically for wall height greater than 8’-0”. When installing wallboard horizontally, attach upper panel first.
b. Apply single layer fire rated wallboard vertically, with edges occurring over firm bearing.
c. Stagger end joints to occur on different framing members on opposite sides of partition.

3. Mechanical Fastening:

a. Screws:

1) Attach single layer of wallboard to metal framing with power driven screws.
2) Minimum edge clearance from mechanical fastener: 3/8”.
3) Stagger mechanical fasteners opposite each other on adjacent ends and edges.
4) Sand abutting ends or edges over support surface.
5) Space screws 16” o.c. when framing is spaced 16” o.c., or 12” o.c. when framing is spaced 24” o.c.

6) Drive screws with a positive clutch electric screwgun.

B. Double Layer Construction:

1. Ceilings:

a. Apply wallboard face layer perpendicular to edges of base layer.
b. Position end joints of face layer to offset base layer joints by at least 10”.
c. Gypsum wallboard shall be installed in such a manner to provide two-hour fire resistant rating shown, when indicated, and in accordance with requirements of UL.

2. Walls:

a. Apply wallboard base layer vertically.
b. Stagger vertical joints of base layer on opposite side of partition to occur on different framing members.
c. Apply face layer horizontally, minimum offset of joints between face layer and face layer shall be at least 10".
d. Gypsum wallboard shall be installed in such manner to provide two hour fire resistant ratings indicated, and in accordance with requirements of UL.

3. Adhesive Lamination:

a. Apply adhesive with notched spreader or caulking gun, as recommended by wallboard manufacturer, for this particular application and job condition.

4. Permanent Attachment:

a. Permanently attach face layer with specified fasteners in accordance with UL requirements for systems selected.

3.15 CONTROL JOINTS

A. Non-Rated Gypsum Construction: Gypsum panel surfaces shall be isolated with control joints or other means, as detailed and at locations indicated on the drawings, if not shown, where:

1. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling;
2. Ceiling or soffit abuts a structural element, dissimilar wall or partition or other vertical penetration;
3. Construction changes within plane of partition or ceiling;
4. Partition or furring run exceeds 30 ft.;
5. Ceiling dimensions exceed 50 ft. in either direction with perimeter relief, 30 ft. without relief;
6. Exterior soffits exceed 30' in either direction;
7. Wings of “L”, “U” and “T” shaped ceiling areas are joined;
8. Expansion or control joints occur in the exterior wall.
9. Less-than-ceiling height door/light frames shall have control joints extending to the ceiling from both opening corners. Ceiling height doorframes may be used as control joints.

B. Fire-Rated Gypsum Construction: Gypsum panel surfaces shall be isolated with control joints or other means, as detailed and at locations indicated on the drawings, if not shown, where:

1. A partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
2. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 lineal feet. NOTE: Full height door frames may be considered a control joint.

3. Interior Ceilings With Perimeter Relief: Control joints shall be installed so that linear dimensions between control joints shall not exceed 50 ft. and total areas between control joint shall not exceed 2500 sq.ft.
4. Interior Ceilings Without Perimeter Relief: Control joints shall be installed so that linear dimensions between control joints shall not exceed 30 ft. and total areas between control joint shall not exceed 900 sq.ft.
5. Exterior Ceilings and Soffits: Control joints shall be installed so that linear dimensions between control joints shall not exceed 30 ft. and total area between control joints shall not exceed 900 sq.ft.
6. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
7. A control joint is desired or incorporated as a design accent or Architectural feature.

C. Install vertical control joints in gypsum sheathing to relieve stress caused by movement in accordance with ASTM C840-08, Section 20.3.1-20.3.5

1. Control joints shall be installed where a partition, wall or ceiling traverse a construction joint (expansion, seismic or building control element) in the base building structure.
2. Control joints shall be installed where a wall or partition runs in an uninterrupted straight plan exceeding 30 linear feet.
3. Control joints in interior ceilings with perimeter relief shall be installed so that the linear dimensions between control joints do not exceed 50 feet and total area between control joints does not exceed 2,500 sq. ft.
4. Control joints in interior ceilings without perimeter relief shall be installed so that the linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 sq. ft.
5. Control joints in interior ceilings with perimeter relief shall be installed so that the linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 sq. ft.
6. Control joint or intermediate blocking shall be installed where ceiling framing members change direction.
7. Where control joints occur in an acoustical or fire rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8” Type X gypsum board, mineral fiber, or other tested equivalent.

3.16 INSTALLATION – ACOUSTICAL ACCESSORIES

A. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

B. Apply acoustical sealant within partitions in accordance with manufacturer's instructions and recommended procedures.

3.17 INSTALLATION – METAL ACCESSORIES

A. Install corner beads and edge trim as specified in ASTM C840.

B. Install corner beads at all external corners.

C. Install edge trim at perimeter of openings and at juncture with other materials except, where covered by casings or flanges.

3.18 JOINT TREATMENT SYSTEM

A. Execute joint treatment in accordance with the manufacturer's printed instructions and these

specifications.

B. Reinforce wall corners and angles with tape folded to conform to the contour and embed in compound.

C. Flanges of corner beads and trim shall be concealed by 2 coats of compound. Feather cut compound 9 inches from beads.

D. Sand compound when thoroughly dry; avoid roughing surfaces of finish wallboard.

E. Leave all surfaces smooth and uniform, ready to receive paint.

F. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840.

1. Level 4 – Provide at Flat or Eggshell Painted walls or ceilings.
2. Level 5 – Provide at Gloss, Semi-Gloss, Enamel, Special Wallcoverings, or where severe lighting conditions occur.

G. Taping and Finishing Joints:

1. Taping and Embedding Joints:

   a. Apply compound in thin uniform layers to all joints and angles to be reinforced.
   b. Apply reinforcing tape immediately.
   c. Center tape over joint, and seat tape into compound.
   d. Leave approx. 1/64" to 1/32" compound under tape to provide bond.
   e. Apply skim coat immediately following tape embedment, but not to function as fill or second coat.
   f. Fold tape and embed in at inside corners to provide true angle.
   g. Allow embedding coat to thoroughly dry prior to application of fill coat.

2. Filling:

   a. Apply second coat of joint compound over embedding coat.
   b. Fill taper flush with surface.
   c. Apply fill coat to cover embedding coat.
   d. Feather out fill coat beyond embedding coat and previous joint compound line.
   e. Joints with no taper: Feather out at least 4” on either side of tape.
   f. Do not apply fill coat on interior angles.
   g. Allow fill coat to thoroughly dry prior to application of finish coat.

3. Finishing:

   a. Spread joint compound evenly over and beyond fill coat on all joints.
   b. Feather coats onto adjoining surfaces so that camber is maximum 1/32” to 1/16”., and to a smooth, uniform finish.
   c. Apply finish coat to taped inside angles to cover tape and taping compound.
   d. Sand final application of compound to provide a smooth surface, ready for decoration.

H. Filling and Finishing Depressions:

1. Apply joint compound as first coat to fastener and other depressions.
2. Apply at least two additional coats of compound after first coat is dry.
3. Leave filled and finished depressions level with plane of surface.

I. Finish Beads and Trim:

1. First Fill Coat:

    a. Apply joint compound to beam and trim.
    b. Feather out first coat from ground to plane of wallboard surface.
    c. Allow compound to thoroughly dry prior to application of second fill coat.

2. Second Fill Coat:

    a. Apply joint compound in same manner as first coat.
    b. Extend beyond first coat onto face of wallboard.
    c. Allow compound to thoroughly dry prior to application of finish coat.

3. Finish Coat:

    a. Apply joint compound in same manner as second coat.
    b. Extend beyond second fill coat.
    c. Feather out finish coat from ground to plane of wallboard surface.
    d. Sand finish coat to provide a flat surface ready for decoration.

4. Taping, filling and sanding is not required at surfaces behind adhesive applied ceramic tile.

3.19 AIRTIGHT DRYWALL OR RETURN AIR PLENUM SPACES

A. Finish all drywall plenum construction below access floor or above finished ceiling.

    1. Finish Level: Level 1.

        a. Seal all pipes, ducts, conduit and other penetrations.
        b. Seal perimeter of all drywall to floors and deck above with sealant.

3.20 INSTALLATION OF ACCESS PANELS

A. Install metal access panels and rigidly secure in place, as required by other sections and other trades.

B. Install in accordance with manufacturer's printed instructions and requirements of regulatory agencies, when applicable.

C. Coordinate the installation of rough bucks, anchors, blocking, mechanical and electrical work which is to be placed in or behind wall framing and ceiling furring. Allow such items to be installed after framing and furring is complete.

3.21 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8” in 10 feet, in any direction.

3.22 PATCHING AND REPAIRING

A. After trim is applied, correct all surface damage and defects as required, to the Architect's satisfaction, so that blemishes will not show through the decoration.

B. If, in the opinion of the Architect, the wallboard is irreparable, the Contractor shall remove same and replace it with new material at no extra cost to the Owner.

C. Punctures:

1. When face paper is punctured, drive new nail approximately 1 1/2" from defective fastening and remove defective fastener.
2. Fill all damaged surface areas with compound.
3. Leave clear depression to receive tape.
4. Permit prefill joint compound to harden prior to application of tape.

D. Ridging:

1. Do not repair ridging until condition has fully developed; approximately six months after installation of one heating season.
2. Sand ridges to receive reinforcing tape without cutting through tape.
3. Fill concave areas on both sides of ridge with topping compound.
4. After fill is dry, blend in topping compound over repaired areas.

E. Cracks:

1. Fill all cracks with compound and finish smooth and flush.

3.23 INSPECTION

A. Wall surface, when prepared for painting, shall be inspected and approved by the Architect before proceeding further.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 093013 – PORCELAIN AND GLAZED CERAMIC TILE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Provide all labor, materials, equipment and services and perform all operations required to complete the installation of all work of this Section and related work as indicated on the drawings and specified herein, including, but not limited to, the following:

1. Ceramic and Porcelain tile floors, bases, and walls in rooms and spaces indicated on Finish Schedule on drawings.
2. Grouting and cleaning all tile work under this section.
3. Cutting, fitting and drilling.
4. Protection and replacement.
5. Additional materials.
6. Caulk joints to match grout at floor, inside corners, and at door frames.
7. Sealer for gypsum board to receive tile.
8. Marble saddles.

B. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

1.02 RELATED WORK

A. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 079200 – Joint Sealants
2. Section 092900 – Gypsum Wall Board
3. Section 102813 – Toilet Accessories

1.03 CONTRACT DOCUMENTS

A. Applicable provisions of the “Conditions of the Contract” shall govern all work under this Section.

1.04 QUALITY ASSURANCE

A. All ceramic tile shall be Standard Grade, of domestic manufacture and shall conform to ANSI A137.1.

B. All Porcelain tile shall be Standard Grade, of domestic manufacture and shall conform to ANSI A137.3.

C. Dry-Set Portland Cement Mortar (Thin-set) shall conform to ANSI A118.1.

D. Installation Specifications: 2020 Handbook for Installation by the Tile Council of North America.

1.05 SUBMITTALS

A. Samples:

1. The Contractor shall, before placing order for tile, submit to the Architect for approval a complete and full set of all tiles, representative of the different sizes, shapes, colors, textures, and finish to be used in the work.

2. Each sample shall be labeled stating the grade. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required.

3. Stone Thresholds.

B. Before proceeding with the tile work, the Contractor shall furnish the Architect with a certificate of Grade (signed by both tile manufacturer and subcontractor) in form adopted by the Tile Manufacturer's Association, Inc., stating the grade, type of tile, identification marks for tile containers, and the name and location of the project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in unopened, original containers bearing manufacturer's labels. Store materials in a clean, dry, protected place and do not leave exposed to the weather. Take all precautions to prevent intrusion of foreign matter. Handle all materials with proper care to prevent damage of any kind.

B. Delivered materials shall match approved samples in all respects.

C. Tile containers shall be branded with, or have sealed within, the shipping mark and other designations corresponding with the information given on the master grade certificate.

1.07 JOB CONDITIONS

A. Tile work shall not be installed in freezing or near freezing weather.

1.08 GUARANTEE

A. The Contractor shall guarantee in writing to the Architect that his work will remain in place without coming loose or cracking, whatever the cause or other defects due to faults of materials or workmanship or method of setting for a period in conformance with the requirements of the Contractor's Guarantee within Specification Section 017000 after the acceptance of the building by the Owner, and that he will, within time, upon notification in writing, immediately replace any defective work or materials and restore all damage to adjoining work caused thereby at his own expense and without cost to the Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Ceramic tile, porcelain tile and base shall be as manufactured by American-Olean Corporation, Dal-Tile Corporation, Crossville or approved equal.

B. Ceramic tile type, size, color and pattern for walls, wainscots and base shall match existing where appropriate or as indicated on the Finish Floor Plans, Schedule and/or Interior Wall Elevations. If ceramic tile type, size, color and pattern are not specified herein, 30 percent of the total amount of all ceramic tile shall be of price group 3, 3"x6" format, from the Classic Color Wheel collection by Dal-Tile. The remaining 70 percent of the total amount of all ceramic tile shall be of price group 2, 3"x6" format, from the Classic Color Wheel collection by Dal-Tile.

C. When scope requires new installation of BOTH floor and wall tile, provide 3”x6” ceramic tile flat top cove base at full perimeter unless otherwise noted. Include both left and right corners as required by layout.

D. When scope requires installation of new wall tile ONLY (existing floor tile to remain), provide Schluter Dilex- AHKA Sanitary Cove Base at full perimeter. Finish to be selected by Architect.

E. When scope calls for painted wall surface with installation of new porcelain floor tile ONLY, provide ceramic tile sanitary cove base and all corners as required by layout.

F. At all wainscot tile applications, include 3”x6” bullnose ceramic tile (on 6” side) or Schluter Jolly at top course of tile. Wainscot typically +/-5’-4” A.F.F. unless otherwise noted. Include both left and right corners as required by layout.

G. In both full and wainscot height tile applications, 3”x6” bullnose tile (on 3” side) or Schluter Jolly shall be used along all vertical outside corners.

H. If porcelain floor tile type is not specified or intended to match existing, provide and install 12"x24" format tile from Dal-Tile’s Theoretical / Theoretical Bold collection or tile of equal value. Pattern and Colors to be approved/provided by architect during submission phase.

I. Floor tile shall be non-slip with a dynamic coefficient of friction not less than 0.42.

J. All mortar mixtures for tile work shall be as recommended by the Tile Council of North America and the American National Standards Institute, Inc.

K. Caulking and expansion joints – one part silicone rubber.

L. Marble Thresholds shall be Alabama White, Class “B” or better, polished. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16” above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2” or less above adjacent floor surface.

2.02 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following products that may be incorporated into the Work include, but are not limited to, the following:

    a. Bostik, Inc.; Hydroment Blacktop 90210
    b. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane
    c. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane
    d. MAPEI Corporation; Mapelastic HPG with MAPEI Fiberglass Mesh

2.03 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. USG Corporation; DUROCK Cement Board.
b. C-Cure; C-Cure Board 990.
c. Custom Building Products; Wonderboard.
d. FinPan, Inc.; ProTEC Concrete Backer Board.

2. Thickness: 1/4”, 1/2" or 5/8” as indicated on the Drawings.

B. Fiber-Cement Backer Board: ASTM C 1288.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following

a. CertainTeed Corporation; FiberCement – Underlayment/ Backerboard.
b. James Hardie Building Products, Inc. – Hardiebacker 1/4”.

2. Thickness: 1/4” or 1/2" as indicated on the Drawings.

2.04 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thinset): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik, Inc.
b. Custom Building Products
c. Laticrete International, Inc.
d. MAPEI Corporation

2.05 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. MAPEI Corporation
b. Ardex Americas
c. Bostik, Inc.
d. Custom Building Products
e. Laticrete International, Inc.

B. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. MAPEI Corporation
b. Bostik, Inc.
c. Custom Building Products
d. Laticrete International, Inc.

2.06 ADDITIONAL MATERIAL

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated and store them where directed by the Owner.

PART 3 – EXECUTION

3.01 INSPECTION

A. Before proceeding with any tiling work, make sure that all sleeves and flashing for various pipes have been installed and that pipes have been run and tested; that conduit which are to be covered are in position and have been approved; and that the locations of all other work required by other trades to be set in the walls or floors are their correct locations, height, or projections. Immediately report any errors or discrepancies to the Architect.

B. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Spaces in which tile is to be set shall be closed to traffic and other work. Spaces shall remain closed until tile is firmly set. Protect tile from damage until work is accepted by the Architect.

3.02 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.03 WORKMANSHIP

A. Internal angles shall be butted and external angles shall be bullnosed using integral combination tile.

B. At door trim, the tile of all base members shall be bullnosed back to the trim with integral combination tile. No block angles will be allowed.

C. Provide manufacturer’s standard trim shapes where necessary to eliminate exposed tile edges.

D. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

E. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

F. All base tile required in any room shall be set before work on the floor is started. The tiles shall be brought to true lines and levels and with joints flush. Base shall stop tile at opening flush with trim.

G. Installation of tile work shall be performed in manner conforming with the best current practice in the industry.

3.04 SETTING

A. Thin-set bed for floor tile shall be in conformance with ANSI 108.5. Surfaces shall be clean, smooth, and level.

B. All tile shall be set in strict accordance with the recommendations of the approved tile manufacturers, the Tile Council of North America, Inc., and the American National Standards Institute, Inc.

3.05 INSTALLATION

A. General:

1. Press individual tile onto setting bed using extreme care to maintain accurate joint alignment and spacing.

2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

3. Tile work shall be laid out in such manner to avoid excessive cutting. No cuts smaller than one-half size shall be made. All areas of tile shall be centered and balances. All cuts shall be made on the outer edge of the field.

4. Smooth all cut edges with a carborundum stone and install no tile with jagged or flaked edges.

5. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

6. The splitting of tile is expressly prohibited.

7. Make corners of all tile flush and level with corners of adjacent tile, with due allowance to warpage tolerances.

8. Keep all joint lines straight and of even width, including miters. All joints shall be uniform, not more than ¼”.

9. Finish floor areas level and plumb with 1/8” of true plan in 8 feet.

10. The finished tile work shall be clean and free of tiles that are pitted, chipped, cracked or scratched.

11. Provide manufacturer’s standard trim shapes where necessary to eliminate exposed tile edges.

12. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

B. Recommended Installation Standards (as per Tile Council of North America):
   1. Floors:

      a. Concrete Subfloor:

         F112-90 – Cement Mortar, Bonded
         F113-90 – Dry-Set Mortar or Latex-Portland
         F122-90 – Thin-Set (on waterproof membrane)

   2. Walls:

      a. Interior Walls (Solid Backing):

         W222-90 – One Coat Method
         W242-90 – Gypsum Board, Organic Adhesive

C. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

D. Joint Widths: By manufacturers recommendations, otherwise install tile with the following joint widths:

   1. Ceramic Mosaic Tile: 1/8 inch.
   2. Quarry Tile: 3/8 inch.
   3. Glazed Wall Tile: 1/16 inch.
   4. Porcelain Tile: 1/8 inch.

E. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

   1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

F. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

G. Metal Edge Strips: Install at locations indicated.

3.06 CUTTING, FITTING, AND DRILLING

A. Do all necessary cutting, fitting, etc. of tile work wherever required in connection with this work as may be necessary to overcome an inaccuracies and to make the materials properly fit and conform to the conditions of the building, and as may be required for other mechanics in connection with their work, and to finish up after them, all in a neat and accurate manner as approved.

B. All intersections and returns shall be neatly formed. All cutting and drilling shall be neatly done without marring the surfaces. Around outlets, piping, fittings or fixtures, etc., the tile shall be fitted close so that the usual plates, collars, or coverings shall overlap the tile.

3.07 GROUTING AND CLEANING

A. As soon as the setting beds have sufficiently set, tile, and floors shall be thoroughly cleaned of all dirt, mortar, and foreign matter by washing and scrubbing with clean water and then all joints in quarry tile shall be grouted with gray Portland Cement and fine white sand mixed with clean water,

forced into joints and finished flush and true. All traces of cement shall be wiped for the surface of tile before hardening. Grout materials shall conform to ANSI A118.1.

B. The floor tile grout shall be spread uniformly over the floor and thoroughly worked into the joints, filling them solidly. After grouting has been completed, all surplus grout shall be removed and the floors left clean.

C. Grout shall be colored by the addition of approved mineral coloring pigment where directed by the Architect.

D. Grout for tile shall be mixed with an integral waterproofing compound.

E. The use of acid solutions is prohibited. Any tile work and other work damaged by the use of a strong cleaning agent shall be replaced at the Contractor's expense.

F. All work of other Contractors, which may have become soiled during the operation of any of the work covered under this Contract, shall be properly cleaned off without damage to such work and left in a clean, neat, and perfect condition, as approved by the Architect.

3.08 PROTECTION AND REPLACEMENT

A. All tile work shall be adequately protected by approved means and all finished tiled areas shall be closed to all traffic or work by an approved barrier. Protection and barrier shall be removed when directed without causing any damage.

B. Protect all work of other trades and contracts from damage caused by work under this section and make good all such damage to the satisfaction of the Architect and without cost to the Owner.

C. Any work of other trades damaged or injured by the removing of any rejected work and the setting on new work or by a trimming, cutting, fitting, drilling, etc., or by cleaning or other cause shall be made at the Contractor's expense.

D. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended. All methods and materials to be per tile manufacturer's recommendations.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 095000 – ACOUSTICAL CEILING SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

1.02 SUMMARY

A. Ceiling Types:

1. The extent of each type of acoustic ceiling is shown on the drawings and in schedules.
2. The types of acoustical ceilings required are as follows:

    a. Mineral fiber acoustic panels in exposed grid suspension system.

B. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 092900 – Gypsum Wall Board
2. Section 099000 – Painting

C. Related Work in Other Contracts:

1. Heating, Ventilating, and Air Conditioning Work:

    a. Grilles, diffusers, and similar air distribution components installed in acoustic ceiling system. Refer to Division 23.

2. Electric Work:

    a. Lighting fixtures, smoke detection systems, sound systems, and similar electrical components installed in acoustic ceiling system. Refer to Division 26, 27 & 28.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

9. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material
10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
11. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
12. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
13. ASTM E 1264 Classification for Acoustical Ceiling Products

B. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

C. NFPA 70 National Electrical Code

D. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

E. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

F. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

G. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System

1.04 SUBMISSIONS

A. Submissions shall be in accordance with Section 013300 - Submissions, and as modified below.

B. Product Data:

1. Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

C. Samples:

1. Architect's review will be for color and texture only. Compliance with all other requirements is the exclusive responsibility of the contractor.

2. Submit samples of the following: (Only when submitting equivalents or substitutions)

a. Exposed grids: Submit three 8" long samples of each type exposed runner.
b. Moldings: Submit three 8" long samples of each type required.
c. Acoustic units: Submit 3 sets of 6” x 6” square samples for each different acoustic unit required. Each set of samples shall show the full range of color and texture to be expected in the completed work.

D. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

F. Maintenance Instructions:

1. Submit two copies of the manufacturer's recommendations for cleaning and refinishing each type of acoustic unit used in the work. Include precautions against materials and methods which may be detrimental to finishes and acoustic efficiency. Submit to Architect for transmittal to Owner.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

2. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory.

C. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

E. Installer Requirements:

1. Acceptable to manufacturer of primary acoustic materials.

1.06 DELIVERY AND STORAGE

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not install interior ceilings until space is enclosed and weatherproof and HVAC system is operational; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

2. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture equilibrium.

3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:

   a. Relative Humidity: 65-75%
   b. Uniform Temperature: 55-70ºF

1.08 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

   1. Acoustical Panels: Sagging and warping.
   2. Grid System: Rusting and manufacturer's defects.

B. Warranty Period:

   1. Acoustical panels: One (1) year from date of substantial completion.
   2. Cirrus: Ten (10) years from date of substantial completion.
   3. Grid: Ten (10) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.09 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

   1. Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.

   2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS

A. Quality Standard:

   1. Provide direct hung suspension system complying with ASTM C 635 for the following structural classifications:

      a. Intermediate duty, unless otherwise indicated.

B. Manufacturers:

   1. Provide suspension systems for acoustic ceilings as produced by one of the following:

a. Armstrong World Industries, Inc.
b. Rockfon North America
c. Certainteed Architectural
d. USG Corporation

C. Hangers:

1. Provide hangers as recommended by suspension system manufacturer to comply with specified structural classification.

a. If suspension system manufacturer does not indicate hanger recommendation, provide not less than 9 gauge galvanized, soft annealed, mild steel wire.

2. Where hanger wires cannot be directly wire-tied to structural or intermediate framing members, provide attachment devices designed for the type of construction used in the work and with a carrying capacity of not less than 5 times the design loads involved.

D. Edge Moldings:

1. Provide manufacturer's standard angle or channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish.

E. Exposed Grid Suspension System:

1. Provide Class A fire rated single web steel main runners, matching interlocking cross runners, adapters, and accessories with exposed cross runners coped to lay flush with main runners.

2. Finish: Smooth, matte white baked enamel.

F. Protective Coatings and Finish:

1. Provide manufacturer's standard coatings and finishes for normal use environments (ASTM C 635), except as noted.

2. In toilet rooms, provide protective coatings and finishes complying with High Humidity Test Requirements (ASTM C 635).

2.02 ACOUSTIC CEILING UNITS

A. Manufacturers:

1. For convenience, details and specifications have been based on products indicated by the following manufacturers:

a. Mineral fiber acoustic panels and tiles: Armstrong World Industries, Inc.

2. Other manufacturers offering mineral fiber acoustic panels and tiles complying with the requirements include:

a. Certainteed Architectural
b. USG Corporation

B. Mineral Fiber Acoustic Panels:

1. Provide Class A Finish units, not less than 5/8" thick, with flame spread of 25 or less; smoke developed index rating of less than 450; complying with performance requirements and

physical characteristics of the specified panels indicated in the construction documents (ASTM E84, NFPA 255, UL 793).

2. Classrooms and meeting rooms shall be provided with an acoustic ceiling tile with a minimum NRC rating of 0.65.

3. Food Storage, food preparation, and food serving areas, toilet rooms, showers and similar areas shall receive non-absorbent, impervious tile to facilitate cleaning as specified in the construction documents.

2.03 ACCESSORIES

A. Hold Down Clips:

1. Provide manufacturer's standard spring steel clips spaced as recommended by said manufacturer in the following spaces:

a. All gymnasiums.
b. All recreation rooms.
c. All Locker rooms including toilet rooms within.
d. All High School corridors.
e. All Middle School corridors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.03 INSTALLATION OF SUSPENSION SYSTEMS

A. General:

1. Coordination: Prior to start of acoustic ceiling work, consult other trades and contractors involved to determine areas of potential interference. Do not start installation of suspension systems until interferences have been resolved.

2. Provide framed openings around all sides of openings receiving items set in or attached to ceilings.

3. Install suspension systems in accordance with manufacturer's printed instructions and to comply with the requirements of ASTM C 636.

B. Hangers:

1. Space not more than 6" from each end and not more than 4' o.c. between ends of members to be supported. Provide additional hangers for support of light fixtures and other items to be

supported by the ceiling suspension system including clips to securely fasten all framing members (used to support fixtures) to each other to prevent eccentric deflection or rotation of supporting runners.

C. Moldings:

1. Provide edge moldings where ceilings meet walls, partitions, and other vertical elements.

2. Corners: Miter cut inside and outside corners or install corner caps.

D. Runners:

1. Support main runners directly from hangers; do not bear on walls or partitions. Space main runners to support acoustic panels and other work resting in or on the ceiling, as required to comply with specified performance requirements. Interlock cross-runners with either main runners or with cross-runners structurally classified as main runners. Install moldings with exposed leg in same plane as bottom flange of runners.

E. Where ceiling suspension systems are attached directly to the bottom chord of joists, ceiling extensions (either an extended bottom chord element or a separate unit, to suit manufacturer’s standards, or sufficient strength to support ceiling construction) shall be provided. Extend ends to within 1/2” of finished wall surface unless otherwise indicated.

3.04 INSTALLATION OF ACOUSTIC CEILING UNITS

A. General:

1. Do not install acoustic ceilings until installation areas meet the following requirements:

a. Exterior openings have been closed and roofs are weathertight.
b. Mechanical, electrical, and other work above ceilings has been completed.
c. Wet work has been installed.
d. Temperature and relative humidity have reached levels which comply with acoustic material manufacturer's recommendations for the units to be used in the work and are acceptable to the installer.

2. Install materials in accordance with manufacturer's printed instructions and other recommendations applicable to the work.

3. Balance border areas to avoid units of less than 1/2 unit width wherever possible. Wherever ceiling area is a multiple of full size acoustic units used in the work, balance alignment to be square and true and install only full size units for entire ceiling including borders.

B. Installation of Acoustic Panels in Exposed Grid Suspension Systems:

1. Install square edge panels to rest on flanges of grid tees with border units supported by moldings.

a. Field cut border units square and support on wall moldings.

2. Provide hold-down clips for panel areas where indicated; omit clips where access areas are shown.

a. Install 2 clips per panel at center of opposite sides of long dimension.
b. Install 4 clips per panel at midpoint of each side.

3.05 CLEAN UP AND PROTECTION

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace units and members which are damaged or cannot be cleaned.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 095316 – ACOUSTICAL TILE RESTORATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.02 DESCRIPTION OF WORK

A. Furnish all labor and materials to restore existing acoustical ceiling tiles and grid as indicated on the drawings and specified herein.

B. The finish subcontractor shall furnish, maintain, and remove when no longer required, all scaffolding, staging, and riggings required for his work.

C. Completely cover all walls, furnishings, merchandise, and floors with plastic and/or drop cloths.

D. Tape/mask all sprinkler heads, smoke detectors, security lights, and other ceiling fixtures to be protected against overspray.

E. Pre-treat (seal) all the ceiling water stains with a primer/sealer, in aerosol.

F. For proper bonding of the acoustical tile coating to non-porous surfaces (i.e., exposed track system), remove dirt, grease, nicotine, or other contaminants with a grid cleaning solution. For more detailed product information, see " Restoration Materials".

G. Ceiling tiles that are overly saturated with grease and/or heavy nicotine must be pre-treated in order to prevent a discoloration of the new water-based surface coating. See "Restoration Materials" for specific recommendations on the pretreatment product.

H. Spray (do not brush or roll) an acoustical tile and ceiling coating on the acoustical ceiling tiles and the exposed suspension grid system. For detailed product information, see "Restoration Materials".

I. Remove and discard all masking paper, tape, and plastic. Vacuum or otherwise remove any remaining spray dust before leaving the area.

1.03 RELATED SECTIONS

A. Section 095000 – Acoustical Ceiling Systems

1.04 REFERENCES

A. ASTM C 423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
B. ASTM C 523 – Standard Test Method for Light Reflectance of Acoustical Materials by the Integrating Sphere Reflectometer.
C. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
D. ASTM E 313 – Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates.
E. ASTM E 795 – Standard Practices for Mounting Test Specimens During Sound Absorption Tests.

1.05 SUBMITTALS

A. General: Comply with requirements of Section 013300 and as modified below.

B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.

C. Test Reports: Submit manufacturer’s test reports from testing performed by independent laboratory of tile coated with acoustical tile coating.

1. Sound absorption.
2. Fire Rating:

    a. Flame spread.
    b. Smoke developed.

3. Light reflectance.
4. Combustion toxicity.
5. Aging.

D. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

E. Warranty Documentation: Submit manufacturer’s standard warranty.

1.06 QUALITY ASSURANCE

A. Applicator’s Qualifications:

1. Use certified/preferred applicator of specified materials.
2. Use applicator experienced in application of specified materials for a minimum of 5 years on projects of similar size and complexity.
3. Use applicator experienced in application of specified materials in fully occupied commercial facilities.
4. Submit list of completed projects including project name and location, name of architect, name of material manufacturer, and approximate area of acoustical ceiling tile restored.
5. Applicator's Personnel: Employ persons trained for application of specified materials.

B. Prerestoration Meeting:

1. Convene prerestoration meeting prior to start of restoration of existing acoustical tile.
2. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer’s representative.
3. Review protection, surface preparation, application, cleaning, and coordination with other work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer’s instructions.
2. Keep materials in manufacturer’s original, unopened containers and packaging until application.

3. Store materials in clean, dry area indoors.
4. Minimum Storage Temperature: 55 degrees F.
5. Do not use materials beyond manufacturer's shelf-life limits.
6. Protect materials during storage, handling, and application to prevent contamination.

C. Protection:

1. Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

D. Replacements:

1. In the event of damage, immediately make all the repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.08 JOB CONDITIONS

A. Provide continuous heating and ventilation as required to maintain surface and ambient temperatures above 55°F for at least 24 hours before, during, and for at least 48 hours after application.

1.09 WORK NOT INCLUDED

A. Do not include painting or finish any other surfaces other than acoustical ceiling tiles and/or grid, unless specified under other sections.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Design is based on the use of coating (paint) products manufactured by ProCoat Products, Inc., 260 Centre Street, Suite D, Holbrook, Massachusetts 02343. Phone (781) 767-2270. Fax (781) 767-2271. Website: www.procoat.com. E-mail: info@procoat.com. Equal products of other manufacturers approved in advance by the Architect may be substituted.

B. The specific products described herein shall be used in the completion of this project. If the bidding contractor proposes to use one or more equivalent products, bids must be accompanied by documentation (provided by the manufacturer of the products they propose to use) that verifies their compliance with the specified materials.

2.02 RESTORATION MATERIALS

A. Acoustical Tile Coating: "ProCoustic" Acoustical Tile and Ceiling Coating.

1. Sound Absorption, ASTM C 423 and E 795: Improve Noise Reduction Coefficient of tile from 0.55 to 0.60.

2. Fire Rating, ASTM E 84: Class A flame spread when applied to surface of acoustical ceiling tiles at a rate of 300 square feet per gallon.

a. Flame Spread: Reduce from 25 to 15.
b. Smoke Developed: Reduce from 10 to 5.

3. Light Reflectance, ASTM C 523: Improve reflectance of light of tile from 0.81 to 0.88.

4. Combustion Toxicity Test: Pass.

5. Aging, ASTM E 313: New acoustical tile with acoustical tile coating has higher Whiteness Index than:

    a. New acoustical tile with high quality latex ceiling paint coating.
    b. New acoustical tile with manufacturer's standard coating.

6. Adhere to Grid: Does not cause tile to adhere to grid system after coating has dried.

7. Physical Form: Smooth pourable liquid. Nontoxic.

8. Primary Composition:

    a. Vehicle: Vinyl acrylic resin.
    b. Pigment: Titanium dioxide, calcium carbonate, silicate wetting and stabilizing agents, and water.

9. Weight: 10.6 pounds per gallon.

10. Specific Gravity: 1.26.

11. Viscosity: 70 to 75 Krebs at 75 degrees F.

12. Solids: 40 percent, plus or minus 1 percent.

13. VOC: Less than 5 g/L

14. Color: White

B. Grid Cleaning Solution: ProCoat Grid Cleaning Solution.

1. Chemically compatible with acoustical tile coating.

2. Does not leave film to prevent acoustical tile coating from bonding to nonporous surfaces.

C. Acoustical Tile Cleaner: ProCoat Acoustical Tile and Ceiling Cleaner.

1. Chemically compatible with acoustical tile coating.

2. Does not leave contaminants that could bleed through and discolor acoustical tile coating.

3. Odorless, biodegradable, and fabric safe.

4. Does not contain caustic bleaches.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine ceilings to receive restoration of acoustical tile.

B. Notify Architect if ceilings are not structurally sound.

C. Do not begin application until unacceptable conditions have been corrected

3.02 PROTECTION

A. Cover walls, floors, equipment, furnishings, merchandise, and other surfaces to be protected against dry-fall spray dust with plastic sheets or drop cloths.

B. Mask light fixtures, sprinkler heads, smoke detectors, security lights, and other items to be protected against direct spray.

3.03 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturer’s instructions.

B. Replace damaged and broken tiles with new tiles or used tiles approved by Architect.

C. Pretreat ceiling water stains with primer/sealer.

D. Apply grid cleaning solution to grids and other nonporous surfaces to be coated to remove dirt, oil, grease, nicotine, and other contaminants to ensure proper bonding of acoustical tile coating.

E. Pretreat tiles saturated with grease or nicotine with acoustical tile cleaner to prevent discoloration of acoustical tile coating.

3.04 APPLICATION

A. Apply acoustical tile coating in accordance with manufacturer's instructions at ceiling locations indicated on the Drawings.

B. Spray acoustical tile coating on acoustical ceiling tiles and exposed suspension grid system.

3.05 CLEANING

A. Remove protective plastic sheets, drop cloths, and masking materials.

B. Remove remaining spray dust.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 096519 – RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 RELATED SECTIONS

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

B. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 033000 – Cast-in-Place Concrete
2. Section 035413 – Self-Leveling Gypsum Underlayment
3. Section 035416 – Self-Leveling Cementitious Underlayment
4. Section 061000 – Rough Carpentry
5. Section 090561.13 – Moisture Vapor Emission Control

1.03 REFERENCES

A. ASTM International:

1. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
3. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
4. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
5. ASTM F 1066 Standard Specification for Vinyl Composition Tile
6. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
7. ASTM F 1700 Standard Specification for Solid Vinyl Tile
8. ASTM F 1861 Standard Specification for Resilient Wall Base
9. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
10. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

B. National Fire Protection Association (NFPA):

1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials
3. NFPA 255 Standard Test Method of Test of Surface Burning Characteristics of Building Materials

1.04 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated, and

installed to performance criteria certified by manufacturer without defects, damage, or failure.

B. Administrative Requirements

1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

2. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify testing (i.e., moisture tests, bond test, pH test, etc).

C. Test Installations/Mock-ups: (Only if indicated on the Drawings) Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.

1. Mock-Up Size: 4' x 4'.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up may be incorporated into the final construction with Owner's approval.

D. Sequencing and Scheduling

1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.

2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.05 SUBMITTALS

A. Submittals shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Submit manufacturer's technical data and installation instructions for each type of resilient flooring, adhesives and accessories.

2. Include manufacturer's written instructions for recommended maintenance practices for each type of resilient flooring and accessories.

C. Samples: (Digital Sample Cards only)

1. For projects requiring initial selection of color and pattern by Architect, submit samples in form of actual sections of resilient flooring, including accessories, showing manufacturer's full range of colors and patterns available, for each type of resilient flooring required.

2. For projects in which selections are included in the CD package, no physical samples are required. Provide digital color cards only for verification of selections.

D. Submit Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers,

patching/leveling compounds, floor finishes (polishes) and cleaning agents and Material Information Sheets for flooring products.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Section 017000 – Contract Closeout. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Warranty: Warranty documents specified herein.

F. Replacement Material:

1. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.

2. Submit to Owner at project site one box of each type and color of tile for each 50 boxes (or fraction thereof) of each type and color installed.

1.06 QUALITY ASSURANCE

A. Select an installer who is experienced and competent in the installation of Armstrong resilient vinyl composition tile flooring and the use of Armstrong Flooring subfloor preparation products.

1. Engage installers certified as Armstrong Commercial Flooring Certified Installers.
2. Confirm installer's certification by requesting their credentials.

B. Fire Performance Characteristics: Provide resilient vinyl composition tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less

C. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

1.07 PRODUCT DELIVERY AND STORAGE

A. Deliver materials to project site in manufacturer's original, unopened containers with labels indicating brand names, colors, patterns, and quality designations legible and intact.

B. Do not open containers or remove markings until materials are inspected and accepted by installation contractor.

C. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

D. Unless otherwise indicated, store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Armstrong, but not less than 55 deg F or more than 85 deg F.

E. All products should be inspected for dye lot, style, color, size, quality and shipping damage prior to installation and should not be installed if any irregularities are observed. Inspect the cartons to be sure all colors are the same shade.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Temperatures provided for installation and initial finishing shall be maintained at levels in accordance with manufacturer's requirements.

C. Maintain ambient temperatures within range recommended by Armstrong, but not less than 65 deg F or more than 85 deg F in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

D. Maintain the ambient relative humidity between 40% and 60% during installation.

E. Until Substantial Completion, maintain ambient temperatures within range recommended by Armstrong, but not less than 55 deg F or more than 85 deg F.

1.09 PROJECT CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65º F and a maximum temperature of 100º F for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55º F in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to product installation recommendations for a complete guide on project conditions.

1.10 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Limited Warranty Period: 5 years for VCT, 20 years for LVT Flooring.

C. Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Armstrong Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Resilient tile flooring, wall base, adhesives and subfloor preparation products and accessories.

1. Armstrong Flooring Inc.,

1770 Hempstead Road, Lancaster, PA 17605
www.armstrongflooring.com/commercial, or equivalent.

2.02 RESILIENT TILE FLOORING MATERIALS

A. Provide Vinyl Composition Tile: Standard Excelon® Imperial® Texture Tile Flooring or Premium Excelon® Crown Texture™ manufactured by Armstrong Flooring, Inc or equivalent.

1. Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.

2. Vinyl composition tile shall conform to the requirements of ASTM F 1066, “Standard Specification Vinyl Composition Floor Tile", Class 2, through-pattern.

3. Pattern and Color: Unless otherwise specified, color shall be as selected by the Architect from manufacturer’s full range of standard VCT patterns and colors. Pattern to match existing where appropriate or as shown on finish floor plans. In the event that the finish floor plans in part or in their entirety are not provided herein, the bid shall include a minimum of two and/or three colors in a full tile basic pattern as determined by the Architect.

4. Size: 12 in. x 12 in. unless otherwise shown

5. Thickness: 1/8 in.

6. Interior Floor Finish Requirements: Interior floor finish shall meet or exceed the requirements of The Building Code of New York State.

   a. The flooring specified is classified in accordance with NFPA 253 as: Class 1, Critical Radiant Flux 0.45 watts/cm2 or greater.
   b. Flame spread rating less than 25 and smoked developed not to exceed 450, in accordance with by ASTM E-84.

7. Slip resistance: ADA compliant with a static coefficient of friction of 0.6 for level surfaces and 0.8 for ramps.

8. Test data:

   a. Heat Stability - (ASTM F1514): $\Delta E < 8$
   b. Size/Squareness - (ASTM F2055): Passes
   c. Deflection - (ASTM F1304): Passes
   d. Chemical Resistance - (ASTM F925): Passes
   e. Static Load Resistance - (ASTM F970): 2000 psi, < 0.005 inches
   f. Residual Indentation - (ASTM F1914): Passes
   g. Slip Resistance - (ASTM D2047): ≥ 0.5 SCOF
   h. Dimensional Stability - (ASTM F2199): Passes
   i. Impact Resistance - (ASTM F1265): Passes
   j. Flammability - (ASTM E648 Critical Radiant Flux): Class 1 (≥ 0.45 W/cm2)
   k. Smoke Density - (ASTM E662): ≤ 450
   l. Limited Commercial Warranty: 5 years

9. Other Manufacturers offering products complying with these requirements include:

   a. Mannington Commercial; Calhoun, GA.

B. Provide Duo™, Exchange™ or Natural Creations™ Luxury Vinyl Tile (LVT) Flooring manufactured by Armstrong Flooring Inc., or equivalent.

1. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.

2. Reference specification - ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.

3. Pattern and Color: Unless otherwise specified, color shall be as selected by the Architect from manufacturer’s current full range of industry colors. Pattern to match existing where appropriate or as shown on finish floor plans. In the event that the finish floor plans in part or in their entirety are not provided within. Include a minimum of two and/or three colors in a full tile basic pattern as determined by the Architect.

4. Size: 6” x 36”, unless otherwise shown

5. Wear layer thickness: 0.020 in. (0.5 mm)

6. Thickness: 0.100 in. (2.5 mm)

7. Interior Floor Finish Requirements: Interior floor finish shall meet or exceed the requirements of The Building Code of New York State.

    a. The flooring specified is classified in accordance with NFPA 253 as: Class 1, Critical Radiant Flux 0.45 watts/cm2 or greater.
    b. Flame spread rating less than 25 and smoked developed not to exceed 450, in accordance with by ASTM E-84.

8. Slip resistance: ADA compliant with a static coefficient of friction of 0.6 for level surfaces and 0.8 for ramps.

9. Test data:

    a. Heat Stability - (ASTM F1514): $\Delta E < 8$avg.,max
    b. Chemical Resistance - (ASTM F925): Passes
    c. Static Load Resistance - (ASTM F970): 2000 psi, < 0.005 inches
    d. Residual Indentation - (ASTM F1914): Passes
    e. Slip Resistance - (ASTM D2047): ≥ 0.5 SCOF
    f. Flammability - (ASTM E648 Critical Radiant Flux): Class 1 (≥ 0.45 W/cm2)
    g. Smoke Density - (ASTM E662): ≤ 450
    h. Limited Commercial Warranty: 20 years

10. Other Manufacturers offering products complying with these requirements include:

    a. American Biltrite Flooring, Sherbrooke, QC.
    b. Polyflor Ltd., Manchester, UK.

2.03 ACCESSORIES

A. Manufacturer: Roppe Corporation, 1602 N Union St., Fostoria, OH 44830. P: (800) 537 – 9527, or equivalent.

B. Rubber Wall Base:

1. Product Name: Pinnacle

2. Material Specification: ASTM F1861, Type TS – rubber, vulcanized thermoset; Group 1 – solid, (homogenous); Style B – Cove except as may be detailed in finish floor plans or as selected by the Architect.

3. Material Height: 4” high unless otherwise noted on Drawings.

4. Material Thickness: ASTM F386, 1/8” (3.2 mm)

5. Material Length: 120’ length.

6. Limited Warranty: 1 Year, Manufacturing only. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

7. Material & Composition: 100% vulcanized homogenous rubber compound comprised of a premium blend & SBR rubber materials.

8. Color: As may be detailed in the finish floor plans or as selected by Architect from the manufacturer’s full range of colors including premium colors. In the event that the finish floor plans in part or in their entirety are not provided herein, for bidding purposes, the Contractor shall utilize and, therefore, for inclusion in the scope of work and contract, that 100 percent of all rubber cove base shown to be provided shall be of Premium Colors or equal.

9. Interior Floor Finish Requirements: Interior floor finish shall meet or exceed the requirements of The Building Code of New York State.

    a. The flooring specified is classified in accordance with NFPA 253 as: Class 1, Critical Radiant Flux 0.45 watts/cm2 or greater.
    b. Flame spread rating less than 25 and smoked developed not to exceed 450, in accordance with by ASTM E-84.

10. Corners: Provide inside and outside corners where noted.

11. Test data:

    a. Surface Burning: ASTM E84/NFPA 255 - Class B
    b. Flammability/Critical Radiant Flux: ASTM E648 / NFPA 253 - Class 1 (>0.45 Watts per sq. cm.), .082 W/cm^2
    c. Smoke Density: ASTM E662/NFPA 258 - Passes (<450), 157 (flaming) - 197 (non-flaming)
    d. Substrate Preparation: Per ASTM F710 and Roppe Technical Data Sheet

B. Accessories:

1. The Contractor shall utilize for bidding purposes and, therefore, for inclusion in the scope of work, all transitional reducers, reducer strips, cove caps, thresholds, edging, fillet strips and/or joiners as may need to be required by the project and/or Architect to provide a complete and acceptable project. All accessories shall be rubber and as manufactured by Johnsonite by Armstrong, ColorMatch colors or equal or luxury vinyl tile moldings to match specified pattern by moldingsonline.com.

C. Adhesives (Cements):

1. Waterproof, stabilized type as recommended by flooring manufacturer for the type of tile to be installed. Asphalt emulsions and other non-waterproof types are not acceptable.

D. Concrete Slab Primer:

1. Non-staining type as recommended by flooring manufacturer.

E. Leveling and Patching Compounds

1. Trowel Grade, featherable, latex modified Portland cement or blended hydraulic cement-based formulation acceptable to the flooring manufacturer.

2. Gypsum based compounds shall not be used in slab on grade construction and will only be considered where specifically approved by the flooring manufacturer.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

B. Ensure substrate meets the requirements of ASTM F710, Roppe Technical Data Sheets and Excelsior Technical Data Sheets.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e., moisture tests, bond test, pH test, etc.).

B. Visually inspect flooring materials, adhesives, and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.

C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates regarding conditions existing at the time of installation.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Defects or conditions that would adversely affect quality and execution of installation.
2. Deviations beyond allowable tolerances of surfaces to receive resilient flooring:

a. Maximum variation in sub-floor surfaces: 1/8 inch in 10 feet.

3.03 PREPARATION

A. Prepare substrates according to Armstrong written instructions to ensure proper adhesion of Resilient Flooring.

1. Prepare concrete substrates in accordance with ASTM F 710.

a. Concrete floors must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitence, mold, mildew, and other foreign materials that may affect dissipation rate of moisture from the concrete, discoloration or adhesive bonding.

b. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.

2. Moisture Testing: Perform moisture testing as recommended by manufacturer. Proceed with installation only after substrates have been tested and meet the minimum requirements from the manufacturer in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride or ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

a. When slab moisture content is in excess of manufacturer's requirements and if further drying is not possible, it may be necessary to install a moisture vapor barrier. If such a barrier product is determined to be required the product shall be deemed acceptable by the flooring and adhesive manufacturer'. The cost for application for such a barrier if not otherwise specified is considered an additional cost to the project. Added cost shall be agreed prior to proceeding.

b. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. A pH test for alkalinity must be conducted on the concrete floor prior to installation with results conforming to manufacturer requirements. If the test results are not within the acceptable range, then installation must not proceed until the problem has been corrected

c. VCT

1) Perform anhydrous calcium chloride test, ASTM F 1869. Results must not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.
2) Special Note: If MVER is greater than 5 lbs. but less than 8 lbs. consult manufacturer for special adhesive recommendations.
3) Perform relative humidity test using in situ probes, ASTM F 2170. Results must not exceed 80%.
4) Special Note: If MVER is greater than 80% but less than 90% consult manufacturer for special adhesive recommendations.

d. LVT

1) ASTM F1869 and ASTM F2170 and pH testing is required when installing LVT. Testing should be performed in several areas including the perimeter of the room, at columns and wherever else moisture might occur. The maximum allowable moisture vapor emission rate (MVER) from the subfloor is 6.0 lbs. The maximum pH range is 9 or less. The In-Situ/RH requirement is not to exceed 75%. Three test results for the first 1,000 sq. ft. are required, with 1 test result for every 1,000 sq. ft. thereafter. The installer may alternate every 1,000 sq. ft. between RH and Calcium Chloride test sites after the first

1,000 sq. ft.

B. Wood subfloors must have a minimum of 18” of cross-ventilated space beneath the bottom of the joist.

1. The floor must be rigid, free of movement.

2. Single wood and tongue and groove subfloors should be covered with ¼” or ½” APA approved underlayment plywood.

a. Use ¼” thick underlayment panels for boards with a face width of 3” or less.
b. Use ½" thick underlayment panels for boards with a face width wider than 3".

3. Do not install over OSB (Oriented Strand Board), particle board, chipboard, lauan or composite type underlayments.

C. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Fill all minor cracks in substrates using approved crack filler in accordance with manufacturer's printed instructions.

E. Flash patch with products acceptable to the resilient flooring manufacturer. If condition requires self-levelling underlayment, refer to that specification in Division 03.

F. Clean substrates of all dirt and loose particles before application of flooring materials.

G. Provide additional underlayment and build up to abutting dissimilar flooring materials.

H. Floor covering shall not be installed over expansion joints.

I. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

J. Store and use adhesives in accordance with the manufacturer's printed instructions.

K. Proceeding with installation constitutes acceptance of the substrate conditions.

L. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.04 INSTALLATION

A. Install flooring in strict accordance with the latest edition of Armstrong Flooring Guaranteed Installation Systems. Failure to comply may result in voiding the manufacturer’s warranty listed in Section 1.10. Strictly adhere to manufacturer's written instructions and the following:

1. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

2. If required, install flooring on pan-type floor access covers. Maintain continuity of color and

pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

3. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

4. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

5. Lay resilient tile so as to ensure full uniform contact with substrate and to produce finished surfaces, which are smooth, even, and in true plane, free of buckles, waves, or other imperfections.

6. Cut and scribe tile neatly into breaks and recesses, walls, door frames, casework, and around pipes, columns, and other projections where flashed base is not required.

7. Lay tile square with room axis. Do not install border tiles that are less than 1/2 the width of a field tile. Tile against walls shall be the same width on each side of room.

8. Tile pattern when laid shall lie in an alternating direction as determined by the Architect.

9. Install with Armstrong adhesive specified for the site conditions and follow adhesive label for proper use.

10. Open enough cartons of floor tiles to cover each area, and mix tile to ensure shade variations do not occur within any one area.

11. Roll the flooring in both directions using a 100 pound three-section roller.

12. Vinyl Tile flooring must be welded. Note: It is recommended to heat weld seams to provide a more sterile and water tight seam.

13. Armstrong Resilient Sheet Flooring may be flash coved.

    a. Use Johnsonite CFS-00-A Cove Filler Strip.
    b. Net fit flooring material into the appropriate Johnsonite cove cap.

B. Rubber Base:

1. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths if practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

2. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

3. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

4. Comply with Roppe's written instructions for installing rubber base.

5. Use approved cove base adhesive and apply in accordance with manufacturer's printed instructions. Adhesive shall hold base tightly in contact.

6. Where necessary, patch and fill back-up material with underlayment material to provide continuous, uniform surface.

7. Scribe base accurately; use specified preformed corners; butt joints between sections tightly.

8. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is either indicated or required.

9. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

10. Tightly adhere resilient wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

11. Do not stretch resilient base during installation.

C. Reducing Strips: Install at points of transition from new resilient flooring to dissimilar flooring material. Whenever possible, locate strips between door jambs centered under doors.

3.05 ADJUSTMENTS

A. Reset any tiles which have not seated in a level plane with surrounding tiles.

B. Carefully remove and replace any tiles with broken corners with surrounding tiles.

3.06 CLEANING AND PROTECTION

A. Perform initial and on-going maintenance according to the latest edition of the Maintenance Instructions for Vinyl Composition & Bio-Based Tile.

B. Protect floors from rolling loads for 72 hours after installation by covering with hardboard or plywood. Protect the floor with un-dyed, untreated building paper until final inspection.

C. Initial cleaning and maintenance is the responsibility of the installing contractor and must be performed as soon as possible after installation. Initial cleaning may be not be performed until 3 days (72 hours) after installation or as otherwise specified by the manufacturer. The intent is to allow the tile become well seated in the adhesive and to prevent excess moisture and cleaning agents from interfering with the adhesive bond. Sweep and protect the floor until initial cleaning and maintenance can begin.

D. Initial Cleaning and Maintenance after Installation:

1. Sweep or vacuum floor thoroughly.

2. Clean flooring utilizing a pH neutral cleaner such as Super Shine All by Hillyard. Allow to stand for 5-15 minutes, but do not allow to dry. Scrub with a single disc rotary machine (175-350 rpm) with a blue or green pad. Remove solution and rinse with clean water. Allow flooring to dry completely before applying finish.

   a. Heavily soiled floor may require a stripping procedure as the initial cleaning.

3. Floor finish:

   a. For VCT, Apply four coats of a manufacturer approved high quality commercial floor finish such as Super Hil-Brite by Hillyard, allowing to dry completely between coats.

3.07 CLEAN UP

A. Remove from the site and legally dispose of all cartons, rubbish, and debris resulting from the work of this Section.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 099000 – PAINTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

1.02 DESCRIPTION

A. Work included: Paint and finish all new and existing interior and exterior surfaces related to the proposed work area including surface preparations.

1. Examine the specifications and drawings of all trades and thoroughly be familiar with all provisions regarding painted work included therein. Surfaces shown, noted, scheduled, or specified to receive painters' finish as part of the work of this section.

2. The painting subcontractor shall furnish, maintain, and remove when no longer required, all scaffolding, staging, and riggings required for this work.

1.03 RELATED WORK DESCRIBED ELSEWHERE

A. Shop Coats: Refer to specific project manual sections for shop coats on items such as structural steel, miscellaneous metal, custom hollow metal work, and similar items.

B. Pre-Finished Items: Refer to specific project manual sections for factory-finished, or installer finishes.

C. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 033000 – Cast-in-Place Concrete
2. Section 042000 – Unit Masonry
3. Section 051200 – Structural Steel Framing
4. Section 052100 – Steel Joist Framing
5. Section 053000 – Metal Decking
6. Section 055000 – Metal Fabrications
7. Section 055200 – Metal Railings
8. Section 062000 – Finish Carpentry
9. Section 081113 – Hollow Metal Doors and Frames
10. Section 092900 – Gypsum Wall Board
11. Section 260500 – Common Work Results for Electrical

1.04 REFERENCES

A. Steel Structures Painting Council (SSPC):

1. SSPC-SP 1 - Solvent Cleaning.
2. SSPC-SP 2 - Hand Tool Cleaning.
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.

7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

C. California Department of Public Health (CDPH):

1. CDPH v1.1-2010 and V1.2-2017

D. LEEDv4 EQ Credit: Indoor Environmental Quality-Low Emitting Materials.

1.05 SUBMISSIONS

A. General: Comply with requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Submit to the Architect a complete schedule of paint materials proposed to be furnished and installed under this section, including name of manufacturer and type of paint.

2. Submit Product Data for each paint product type as required to demonstrate compliance with the specified requirements including the following:

a. Product characteristics.
b. Surface preparation instructions and recommendations.
c. Primer requirements and finish specification.
d. Storage and handling requirements and recommendations.
e. Application methods.
f. Cautions for storage, handling and installation.

3. For information only, submit two copies of manufacturer’s specifications, including paint analysis and application instructions for each material. Indicate by transmittal that a copy of each manufacturer’s instructions has been distributed to the applicator.

C. Verification Samples: Submit three (3) 8 ½” x 11” paint strike offs of each paint color and paint type specified for color match verification. Identify each sample as to finish/ sheen, formula, color name, and color number.

D. Stain Samples: Submit three (3) 8 ½” x 10” wood samples of stain matching specified wood species and color for architect’s approval.

E. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC’s).

F. Only submit complying products based on project requirements (i.e. LEED). Paint application must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO).

G. USGBC LEED V4 Submittals (when applicable):

1. MRc2 Environmental Product Declaration Product Language: Products shall be selected with a preference to products that have product-specific environmental product declaration

documentation.

2. EQc2 Low Emitting Materials: The VOC content of all adhesives, sealants, paints and coatings in this Section shall not exceed the VOC limits established in Division 01 Sustainable Design sections.

1.06 WORK NOT INCLUDED

A. Do not include painting, which is specified under other sections.

B. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.

C. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this section except as may be specified herein.

D. Do not paint any moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices, and motor shafts, unless otherwise indicated.

E. Do not paint over any required labels or equipment identification, performance rating, name or nomenclature plates.

F. Do not paint prefinished items, concealed surfaces, and finished metal surfaces unless indicated.

1.07 DEFINITIONS

A. The term “paint,” as used herein, means all coating systems materials including primers, emulsions, epoxy, enamels, stains, sealers, fillers, and other applied materials where used as prime, intermediate, or finish coats.

1.08 QUALITY ASSURANCE

A. Standards: Comply with standards specified in the section and as listed in Section 014219.

B. Qualifications of Manufacturers: Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Architect.

C. Qualifications of Applicators:

1. A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
2. Provide at least one person who shall be present at all times during execution of the work of this section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this section.
3. Provide adequate numbers of workman skilled in the necessary crafts and properly informed of the methods and materials to be used.
4. Minimum three years of experience in applying commercial coating systems similar to the materials specified.

D. Paint Coordination:

1. Provide finish coats, which are compatible with the prime coats used.

2. Review other sections of this specification as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
3. Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.
4. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as require
5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coating supplied under other sections.
6. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available and as specified herein.

E. Field Samples:

1. Before proceeding with paint application provide a mock-up for evaluation of surface preparation techniques and application workmanship, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials, and workmanship.

    a. Finish surfaces for verification of products, colors and sheens.
    b. Finish area designated by Architect.
    c. Provide samples that designate primer and finish coats.
    d. Compatibility and Adhesion: Check after one week of drying and curing by testing in accordance with ASTM D3359; Adhesion by tape test. If coating system is incompatible, additional surface preparation up to and including complete removal may be required.
    e. Do not proceed with remaining work until the Architect approves the mock-up.

2. Sample areas, when accepted by the Architect, shall serve as a minimum standard for work throughout the entire project.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer’s original unopened packages and containers bearing manufacturer’s name and label and the following information:

1. Product name or title.
2. Product description (generic classification or binder type).
3. Federal Specification Number, if applicable.
4. Manufacturer’s stock number and date of manufacture.
5. Contents by volume, for pigment and vehicle constituents.
6. Thinning instructions.
7. Application and use instructions.
8. Surface preparation.
9. VOC Content.
10. Environmental handling.
11. Color name and number.

B. Storage:

1. Provide proper storage to prevent damage to, and deterioration of, paint materials.
2. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing. Storage area is to be kept neat and clean. Any damage to the storage area or surrounding occurring during its use for storage shall be repaired to its original state (Architect’s acceptance required). Remove all soiled or used rags, waste, and trash from the building every night and take every precaution to avoid damage of fire.
3. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Handling:

1. Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

D. Protection:

1. Use all means necessary to protect the materials of this section before, during, and after installation. Protect the work and materials of other trades. Remove, clean, restore to original condition any spatter, runs, drips, spillage, overspray on other materials not intended to be painted.

E. Replacement:

1. In the event of damage, immediately make all the repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.10 JOB CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results, as required to maintain surface and ambient temperatures above 50ºF for at least 24 hours before, during and for at least 48 hours after paint application. Do not install products under environmental conditions outside manufacturer's recommended limits.

B. Do not apply paint in snow, rain, fog, or mist, or when relative humidity exceeds paint manufacturer’s recommended limits. Avoid painting surfaces while they are exposed to hot sun.

C. Lighting: Provide minimum 80 foot candle light level at mid-height of substrate surface.

1.11 EXTRA STOCK

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

B. Amount: Upon completion of the work of this section, deliver to the Owner an extra stock equaling 1% of each color, type, and gloss of paint used on the work but not less than 1 gal (3.8 l) or 1 case, as appropriate.

C. Packaging: Tightly seal each container and clearly label with the contents and location used.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Sherwin-Williams, which is located at: 101 Prospect Ave.; Cleveland, OH 44115; ASD Toll Free Tel: 800-524-5979; Tel: 216-566-2000; Email: request info specifications@sherwin.com; Web: www.swspecs.com. Local representative: Anthony Spanevello, Architectural Account Executive | Tel: (516) 406-0612 | Email: Anthony.M.Spanevello@sherwin.com; or Architect approved equal.

2.02 PAINT MATERIALS

A. Design is based on the use of paint products manufactured by Sherwin Williams. The materials of this manufacturer are named in the painting schedule. Equal products of other manufacturers

approved in advance by the Architect may be utilized.

B. General: Provide the best quality grade of the various types of coatings as regularly manufactured by paint materials manufacturers approved by the Architect. Materials not displaying the manufacturer's identification as a standard best-grade product will not be acceptable.

C. Durability: Provide paints of durable and washable quality. Do not use paint materials, which will not withstand normal washing, as required to remove pencil marks, ink, ordinary soil, and similar material without showing discoloration, loss of gloss, staining or other damage.

D. Colors and Glosses: Provide colors and glosses as specified or to match existing from manufacturer's full range of colors for each product indicated.

E. Paints and Coatings:

1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
2. For opaque finishes, follow manufactures product instructions for optimal color conformance.

F. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

G. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

H. Undercoats and Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer and use only the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

I. Standards: Provide paint materials which meet or exceed the standards listed for each application in the Painting Schedule in Part 3 of this section.

1. All paint to be V.O.C. compliant. The VOC concentrations (in grams per liter) of the product shall comply with the U.S. EPA 40 CFR 59 Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. OTC as used in this Section refers to the Ozone Transmission Commission. OTC II has established the following VOC levels for Maryland, New York and Connecticut, United States. Products shall meet the following OTC II limits for VOC's when jobs are in these states.

a. Interior flat paints: 50 grams per liter or less, per gallon.
b. Interior enamels: 100 grams per liter or less, per gallon.
c. Interior stains: 250 grams per liter or less, per gallon.
d. Interior primers: 100 grams per liter or less, per gallon.
e. Rust preventive coatings: 250 grams per liter or less, per gallon.
f. Dry fog coatings: 150 grams per liter or less, per gallon.
g. Floor coatings: 100 grams per liter or less, per gallon.
h. Flats50 g/L
i. Non-Flats100 g/L
j. Primers Sealers and Undercoats100 g/L
k. Floor Coatings100 g/L
l. Concrete/masonry Sealer100 g/L
m. Rust Preventative Coatings250 g/L
n. Industrial Maintenance Coatings250 g/L

o. Stains, Exterior250 g/L
p. Wood Coating/Varnish/stain275 g/L
q. Zinc Rich Primers340

J. Application Equipment: For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint and as approved by the Architect.

K. Other Materials: All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be new, first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Prior to installation of the work of this section, carefully inspect the installed work of all other trades and verify that such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturer's recommendations as approved by the Architect.

B. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.02 SURFACE PREPARATION

A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.

1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's requirements and application instructions as approved by the Architect. Clean each surface to be painted prior to applying paint or surface treatment.
2. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
3. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply solution and scrub the mildewed area. Allow solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
4. Remove oil and great with clean cloths and cleaning solvents of low toxicity and a flash point in excess of 38ºC (100ºF), prior to start of mechanical cleaning.
5. Remove all removable items, which are in place and are not scheduled to receive paint finish or provide surface-applied protection prior to surface preparation and painting operations.
6. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
7. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air,

surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

8. Schedule the cleaning and painting in coordination with the Owner.

B. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.

C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.

D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

E. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments.

F. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.

G. Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.

H. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.

I. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.

J. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.

K. Plaster: Must be allowed to dry thoroughly for at least 30 days before painting unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the

surface is hard, rinse with clear water and allow to dry.

L. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow. Coordinate with paint specified and manufacturers requirements for appropriate preparation to receive paint specified.

1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure

water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.

10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.

M. Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.

N. Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments such as Loxon.

O. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.03 INSTALLATION

A. General

1. Apply products in accordance with manufacturer’s instructions.
2. Secure color schedules before applying paint or finish. Tint primer and undercoat to the approximate shade of the finish coat.
3. Apply all materials under adequate illumination and as follows:

    a. Brush Application: Brush out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.
    b. Spray Application:

        1) Confine spray application to metal framework and similar surfaces where hand brushwork would be inferior.
        2) Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building of film thickness of two coats in one pass.

4. Allow sufficient drying time between coats. Modify the period as recommended by the material manufacturer to suit adverse weather conditions.
5. Apply materials in sufficient quantity to insure complete coverage and hide. Provide and apply additional coats until paint film is uniform in finish, color, appearance, and coverage.

B. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.

C. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.

D. Apply coatings using methods recommended by manufacturer.

E. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

F. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.

G. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

H. Completed work shall match the approved samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.

3.04 STAIN APPLICATION

A. Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view and dust off. Scrape and clean small, dry seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of priming coat. After priming fill holes and imperfections in finished surfaces with putty or plastic wood filler. Sandpaper smooth when dried.

B. Stain or seal wood required to be painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases and paneling.

C. When transparent finish is required, use spar varnish for back priming.

D. Back-prime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.

E. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

3.05 CLEANING AND PROTECTION

A. Cleaning:

1. Promptly remove spilled, splashed, or splattered paint on finish as work proceeds and upon completion.
2. Keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris during progress of work.
3. Upon completion of work, leave premises in neat and clean condition.

B. Protect finished coatings from damage until completion of project.

C. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

D. Completed work shall match the approved samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.

3.06 PAINTING SCHEDULE

A. General: Painting required under this section is called for on the drawings. Paint types for specific surfaces, exterior and interior are as defined below:

Exterior Work			
Surface	**1st Coat**	**2nd Coat**	**3rd Coat**
Hollow Metal Doors & Frames (Note 3 & 4)	B or *	A	A
Exposed Miscellaneous Metal or Structural Steel (Note 3 & 4)	T or *	I	I
Steel Handrails & Steel Lintels (Note 3 &4)	T	I	I
Traffic Bearing Exterior Metals (Steel Ladders – Foot Traffic) (Note 3 & 4)	N	R	R
Aluminum (Note 4)	B	A	A
Wood, Visible Blocking, Plywood	C	D	D
Visible Metal Plaster accessories adjoining stucco	T	I	I
Concrete Block	E	F	F
Galvanized Metal (Note 4)	B	I	I
Concrete Walls	O	F	F
Visual Contrasting Stripe at Stair Tread Nosings, concrete, bluestone, masonry or steel (Note 1)	H	-	-
Interior Work			
Surface	**1st Coat**	**2nd Coat**	**3rd Coat**
Concrete Block	E	G	G
Plaster	M	G	G
Gypsum Drywall	M	G	G
Concrete Walls	O	G	G
Concrete Floors, light to moderate duty, (Note 1) 1st coat is a thin coat to prime	P	P	P
Concrete Floors, moderate to Heavy duty, no vehicular traffic (Note 1 & 6)	Q	Q	Q
Concrete Floors (High Vehicle Traffic, Wet Environments) (Note 1)	N	U	R
Wood-Painted (Note 2 & 5)	C	G	G
Wood-Natural Finish (Note 5)	J	J	J
Wood-Stained Finish (Note 5)	V	S – 2 coats	J – 2 coats
Hollow Metal, Steel Handrails & Steel Stair Components (Note 3 & 4)	B or *	A	A
Exposed Structural Steel & Steel Joists (Note 3 & 4)	B or *	K or L	K or L
Galvanized Steel Floor or Roof Deck (Note 4)	B or *	K or L	K or L
Miscellaneous Metal (Note 3 & 4)	B or *	L	L
Steel Floor Deck (Diamond Plate etc.) (Note 3 & 4)	N	R	R
Galvanized Metal (Note 3 & 4)	B	A	A
Exposed Ductwork (Note 4)	B	K or L	K or L

*Shop Coat – See other sections of Project Manual

Note 1: Where non-skid properties are required, a non-skid additive shall be used. Apply per manufacturer's instructions. Confirm if required via Architect.

Note 2: This is for large, exposed surfaces. Where paint is indicated on narrow recesses, or on visible surface of back-up supports or blocking, use flat enamel.

Note 3: Inspect shop coat and touch up prior to finish coat application to prevent finish coat contacting bare steel. All exposed structural steel is to be painted in finished areas as per schedule unless noted otherwise on the Contract Documents.

Note 4: Prior to priming and painting of exposed ductwork, galvanized steel, aluminum and other non-ferrous metals the Contractor shall clean bare metal with an oil and grease emulsifier (SIMPLE GREEN Heavy-Duty & All-Purpose Degreaser or equal). This product shall be ready to apply from the container. Careful surface preparation and cleaning is required. All surfaces shall be thoroughly clean and free from all grease, wax, oil, polish, loose paint, dirt or rust. Do not use mineral spirits, turpentine solvent or cleaners which will leave an oily residue. Apply clean and remove/rinse in accordance with manufacturer's instructions.

Note 5: For Wood Flooring finishes see Wood Flooring Specification Section included elsewhere in Division 09 of the Project Manual.

Note 6: The 1st coat "Q" should be diluted to allow greater penetration into the concrete. 3rd coat is required for unpainted concrete applications or when a 3rd coat is need to achieve required film thickness. Provide full prime coat for unpainted concrete. Spot prime bare spots for previously painted surfaces.

3.07 KEY TO PAINTS

* Shop coat: See other section of Project Manual.

A	S-W Pro Industrial DTM Acrylic Semi-Gloss, B66W01151 or S-W Pro Industrial™ Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150/2150 Series
B	S-W Pro Industrial Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series
C	S-W PrepRite® ProBlock® Interior-Exterior Latex Primer-Sealer, B51-600 Series
D	S-W A-100 Exterior Latex Low Sheen, A12W00151 or S-W SuperPaint Exterior Latex Low Lustre, A78-Series
E	S-W Pro Industrial Heavy Duty Block Filler (B42 Series)
F	S-W A-100 Exterior Latex Gloss, A08 Series or S-W SuperPaint Exterior Latex Gloss, A84-Series
G	S-W ProMar 200 Zero VOC Interior Latex Eg-Shel (B20-2600 Series) or Semi-Gloss (B31-2600 Series)
H	S-W Pro-Park™ Waterborne Traffic Marking Paint (B97 Series) with H&C® Sharkgrip® Slip Resistant Additive
I	S-W Pro Industrial Waterbased Alkyd Urethane Enamel Gloss (B53 Series)
J	Minwax Water-Based Polycrylic [for vertical applications only, no floors] or Minwax Oil-Modified Polyurethane (furniture, woodwork, cabinets, doors, hardwood floors)
K	S-W Pro Industrial™ Waterborne Acrylic Dryfall Flat (B42 Series)
L	S-W ProMar 200 Zero VOC Interior Latex Flat (B30-2600 Series)
M	S-W ProMar® 200 Zero V.O.C. Interior Latex Primer (B28 Series)
N	S-W Macropoxy 920 Pre-Prime (B58 Series)
O	S-W Loxon Concrete & Masonry Primer/Sealer (LX02 Series)
P	S-W Armorseal® Tread-Plex™ 100% Acrylic Water Based Floor Coating (B90 Series)
Q	S-W Armorseal® 8100 Water Based Epoxy Floor Coating Satin (B70-8160 Series)
R	S-W Hi-Solids Polyurethane 250 Aliphatic Polyurethane Semi-Gloss or Gloss (B65 Series)
S	Minwax Wood Finish, Water Based, Semi-Transparent, Color Stain
T	S-W Pro Industrial Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series
U	S-W Armorseal 650 SL/RC Self-Leveling/Recoatable Epoxy (B58 Series) or S-W High Performance Flooring System TBD (architect to confirm).
V	Minwax Water-Based Pre-Stain Wood Conditioner

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 101400 – SIGNAGE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install non-illuminated signs at selected locations as specified herein.

1.02 GENERAL REQUIREMENTS

A. Visit the site and check field conditions, locations, and dimensions affecting this work. Report any conditions, which will interfere with, or prevent, proper execution of the work.

1.03 REFERENCES

A. 2017 - ICC 117.1 – Accessible and Usable Buildings and Facilities.

B. ASTM International (ASTM):

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories (UL):

1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

B. Shop Drawings: Provide shop drawings for each type of signage required. Furnish itemized accessory lists, indicating location, height, quantity, and accessories being provided. Detail drawings showing sizes, lettering and graphics, construction details of each type of sign and mounting details with appropriate fasteners for specific project substrates.

C. Message List: Signage report indicating signage location, text, and sign type.

D. Manufacturer's Installation Instructions: Printed installation instructions for each signage system.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and available pictograms, characters, and Braille indications.

F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and typical pictograms, characters, and Braille indications.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum five years documented experience in work of this Section.

B. Installer Qualifications: Minimum five years documented experience in work of this Section.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application

workmanship.

1. Furnish signs designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging.

B. Inspect materials at delivery to verify there are no defects or damage.

C. Store products in manufacturer's original packaging until ready for installation in climate controlled location away from direct sunlight.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials in accordance with requirements of local authorities having jurisdiction.

1.07 PROJECT CONDITIONS

A. Install products in an interior climate controlled environment.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Signs shall be as manufactured by Allstate Sign and Plaque, 70 Burt Drive, Deer Park, New York 11729, or Architect approved equal. (Signage shall comply with M.U.T.C.D.)

2.02 SIGNAGE - GENERAL

A. It is the intent of these specifications to establish a sign standard for the Owner including but not limited to, wall-mounted directional signs, primary room identification, restrooms, assembly spaces and all code compliant Braille signage.

B. General interior signage requirements: All signs shall be as follows:

1. The vertical space allowed for a pictogram shall be a minimum of 6" in height, (i.e., picture a 6" high window with a pictogram superimposed into it; the pictogram itself does not have to be a full 6"). Within this 6" window, you cannot place Grade 2 Braille or text. Provide 1/8" thick raised white international symbol of access (where required) and raised letters and/or numerals 1/32" high (minimum), upper case Sans Serif, accompanied with Grade 2 Braille characters at least 5/8" high, but no higher than 2".

2. Raised borders around pictograms are not required and can sometimes cause confusion for the tactile reader. If used, it is suggested that they be placed a reasonable distance from the other text elements.

3. Pictograms do not need to be raised. This gives the sign maker the option to use surface engraving, reverse engraving, raised, or other methods for the pictogram portion of the sign.

Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram.

4. Pictographs and Braille shall comply with ICC A117.1-2017 and NYS Building Standards and Codes, 2016 Uniform Code Supplement. Chapter 3, Amendments to the 2020 IBC, 2020 IBC Section 202 (Definitions). International Symbol of Accessibility.

5. ADA Pictograms shall be the current standard symbol for accessibility for New York State adopted per Law A.8193/S.6846.

2.03 INTERIOR SIGNAGE

A. Provide the following Signs at locations shown on the drawings:

1. Signage color and style shall be as selected by Architect from manufacturer's full line of colors unless otherwise indicated.

B. Furnish and install, at all handicap accessible entries, signage that reads "Accessible". Allstate sign model #: X-5689. Signage color shall be "Blue".

C. Furnish and install, at locations at the site (where shown on drawings, pole mounted, die embossed 12" x 18" heavy duty steel signs, protected with three (3) coats of baked enamel. Sign shall be provided with the international words "ENTRANCE" with a directional arrow. Allstate model #: "X-7081 or X-7080" – Color: Blue. Signs shall be securely mounted on heavy rail steel (weight 2 lbs./ft.) U-channel posts, driven into the ground a minimum of four (4) feet or embedded into minimum 1'-0" diameter x 2'-0" deep concrete footings.

D. Furnish and install all building "Maximum Occupancy" signage, (18"h x 24"w) in all areas affected by the scope of work where not already provided. (Maximum Occupancy Signage shall be provided at all cafeterias, cafetoriums, gymnasiums, auditoriums and any large group assembly spaces where the floor area exceeds 1,000 sf. Contractor shall confirm all locations, style, and quantity with the Architect.) All signage shall be in conformance with local Fire Marshal's Office requirements. (Note – where shown on drawings).

E. Furnish and install "Emergency Evacuation Route" signage at all areas affected by the scope of work, (12"h x 18"w), location, style and quantity shall be as directed by Architect. Refer to Section 2.02 for lettering and Braille requirements.

F. Furnish and install at all corridor doors, door number and/or name signage. 'Allstate' sign model #: E-BTCUST. Signage shall be as selected by Architect from manufacturer's full line of colors.

G. Furnish and install girl's and boy's multi-use handicapped accessible toilet rooms, "Allstate" sign model #'s: X-7107 and X-7108.

H. Furnish and install girl's and boy's multi-use non-handicapped accessible toilet rooms, "Allstate" sign model #'s: X-7096 and X-7095.

I. Furnish and install women's and men's multi-use handicapped accessible toilet rooms, "Allstate" sign model #'s: X-5688 and X-5671.

J. Furnish and install women's and men's multi-use non-handicapped accessible toilet rooms, "Allstate" sign model #'s: X-5687 and X-5672.

K. Furnish and install Faculty Single occupancy handicapped accessible toilet rooms, "Allstate" sign model #'s: X-5688, X-5671, or X-7059. Add on signage shall be included as follows: E-FA26 or E-ST26, as selected by Architect.

L. Furnish and install Faculty Single occupancy non-handicapped accessible toilet rooms, “Allstate” sign model #’s: X-5687, X-5672, or X-5673. Add on signage shall be included as follows: E-FA26 or E-ST26, as selected by Architect.

M. Furnish and install at Girl’s Single occupancy handicapped accessible toilet rooms, “Allstate” sign model #’s: X-7107.

N. Furnish and install at Boy’s Single occupancy handicapped accessible toilet rooms, “Allstate” sign model #’s: X-7108.

O. Furnish and install at Gender Neutral Single occupancy non-handicapped accessible toilet rooms, “Allstate” sign model #: X-8003.

P. Furnish and install at Gender Neutral Single occupancy handicapped accessible toilet rooms, “Allstate” sign model #: X-8004.

Q. Furnish and install at Locker Rooms on Designated Lockers, “Allstate” Sign Model #: X-5689. Sign Color shall be ‘Blue’.

2.04 CHARACTER PROPORTION

A. Letters and numbers in signs shall have a width-to-height ratio between 3:5 and 1:1.

B. Stroke width-to-height ratio shall be between 1:5 and 1:10.

2.05 SIGN FINISH AND CONTRAST

A. Characters and background of signs shall be eggshell, matte, or other non-glare finish.

B. Characters and symbols contrast with their background - either light characters on a dark background or dark characters on a light background. Examples of acceptable color combinations would be white/black, white/red, and white blue. Unacceptable would be light green/dark green, dark green, and dark gray/black.

C. The preference is through the use of light characters or symbols on a dark background.

D. All interior plastic signage shall have a surface burning characteristic, Class A and flame spread rating not to exceed 0-25 and smoke developed rating not to exceed 450, in accordance with ASTM E-84.

2.06 ACCESSORIES

A. Double Stick Tape: 3M VHB tape or equal, with adhesive both sides.

B. Fasteners: Expansion anchors for mounting signs to existing or new masonry walls or sheet metal screws for fastening to aluminum framed walls; screw head color to match sign color.

1. Verify mounting locations with Architect and provide suitable fasteners for each substrate condition.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements

for installation tolerances and other conditions affecting performance of the work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 MOUNTING LOCATION AND HEIGHT

A. Mounting locations for braille signage shall be as follows:

1. Where a sign containing raised characters and braille is provided for rooms and spaces, signs shall be installed on the wall adjacent to the latch side of the door.

2. Where a sign containing raised characters and braille is provided at double doors with one active leaf, the sign shall be located on the inactive leaf.

3. Where a sign containing raised characters and braille is provided at double doors with two active leaves, the sign shall be located to the right of the right-hand door.

4. Where there is no wall space to the latch side of a single door, or to the right side of double doors, signs shall be placed on the nearest adjacent wall.

5. Signs containing raised characters and braille shall be located so that a clear floor area 18” minimum by 18” minimum, centered on the raised characters is provided beyond the arc of any door swing between the closed position and 45 degree open position.

B. Mounting height shall be 48” minimum above the floor, measured to the baseline of the lowest raised character and 60" maximum above the floor, measured to the baseline of the highest character of the sign.

C. Mounting location for such signage shall be so that a person may approach within 3" of signage without encountering protruding objects or standing within the swing of a door.

D. Location and colors of signs shall be as selected by the Owner and approved by the Architect. Contractor shall submit shop drawing indicating room name/location and wording along with color samples and manufacturer’s literature for review and approval.

E. Signs shall be securely mounted to the wall surface as recommended by the manufacturer and as approved by the Architect.

F. All signage shall be installed in accordance with ICC A117.1-2017 and ADA standards and requirements.

3.03 GUARANTEE

A. All materials and workmanship shall be guaranteed for a period in conformance with the requirements of the Contractor’s Guarantee within Specification Section 017000 from date of final completion in accordance with the applicable provisions of the "General Conditions".

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 102113 – METAL TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 specification sections, apply to the work of this section.

B. Provide all labor, materials, etc. necessary for the completion of the work of this section as specified or shown on the drawings.

C. Work of this section consists of, but is not limited to, the following:

1. Provision and installation of powder coated steel toilet stalls, stall doors, urinal screens, privacy screens, restroom entry partitions and shower partitions.

2. Hardware, etc. for stalls & partitions.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry
B. Section 055000 – Metal Fabrications
C. Section 102813 – Toilet Accessories

1.03 REFERENCES

A. ASTM International:

1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
3. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity

B. United States Green Building Council (USGBC): LEED Green Building Rating System

1.04 SUBMITTALS

A. All submittals shall be in accordance with Section 013300 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Literature indicating typical panel, pilaster, door, hardware and fastening.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.

C. Shop Drawings:

1. Dimensioned plans indicating layout of toilet compartments.

2. Dimensioned elevations indicating heights of doors, pilasters, separation partitions, and other components; indicate locations and sizes of openings in compartment separation partitions for toilet and bath accessories to be installed in partitions; indicate floor and ceiling clearances.
3. Details indicating anchoring components (bolt layouts) and methods for project conditions; indicate components required for installation, but not supplied by toilet compartment manufacturer.
4. Details showing locations for adequate steel reinforcements of wood blocking in walls to be provided for proper securement of the finished work.

D. Selection Samples: For each finish product specified, one complete set of color selection guides representing manufacturer's full range of available colors, textures and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, texture and pattern.

F. LEED Green Building Rating System: Submit manufacturer's documentation of recycled content, in accordance with LEED credit calculations.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

C. Lay cartons flat, with adequate support to ensure flatness and to prevent damage to pre- finished surfaces.

D. Do not store where ambient temperature exceeds 120 degrees F (49 degrees C).

1.06 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at a minimum of 60 degrees F (15.6 degrees C).

1.07 WARRANTY

A. Manufacturers Standard Warranty: Provide warranty for Powder Coated Steel Material against chipping, flaking, cracking, or discoloration for 3 years, assuming proper maintenance according to manufacturer's recommendations.

1.08 COORDINATION

A. Coordinate Work with placement of support framing and anchors in walls and ceilings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: ASI Global Partitions, which is located at: 900 Clary Connector; Eastanollee, GA 30538; Tel: 706-827-2700; Fax: 706-827-2710; Email: request info (sales@asi-globalpartitions.com); Web: http://asi-globalpartitions.com

2.02 COMPARTMENTS AND SCREENS

A. Toilet Compartments: Floor anchored/overhead braced.

1. Compartment Depth and Width: As scheduled and indicated on Drawings.
2. Door Width: 24 inches (610 mm), minimum; at ADA accessible compartments 36 inches (915 mm) minimum.
3. Height Above Floor: 12 inches (356 mm).
4. Door/Panel Height: 58 inches (1397 mm).
5. Pilaster Height: 82 inches (2083 mm).

B. Privacy and Urinal Screens: Wall hung:

1. Screen Panel Size: 24 inches (610 mm) wide by 48 inches (1219 mm) high.
2. Height Above Floor: 12 inches (305 mm) for 48 inches (1219 mm) high.

2.03 POWDER COATED INTEGRATED PRIVACY STEEL TOILET COMPARTMENTS

A. Doors, Panels, Screens, and Pilasters: Tension leveled, cold-rolled galvannealed steel face sheet, bonded under pressure to honeycomb core with non-toxic adhesive.

1. Doors, Screens, and Panels: 1 inch (25 mm) thick; 22 gage (0.760 mm) steel.
2. Pilasters: Overhead Braced, Floor to Ceiling 1-1/4 inches (32 mm) thick, 22 gage (0.912 mm) steel.
3. Edge Moldings: panels, pilasters: Continuous roll-formed interlocking, 22 gage (0.760 mm) steel crown molding, brazed and ground smooth at corners.
4. Edge Moldings Door: Integrated sight line blocking molding affixed to door during fabrication. Formed by continuous roll form process 22-gauge steel molding, brazed and ground smooth.

B. Finish: Epoxy/polyester powder coat electrostatically applied to phosphate treated steel, baked to cure. Color as selected by Architects from manufacturer's standard colors.

C. No-Sight System: Integral to door construction required.

1. Powder coated to match partition color concurrent with fabrication.
2. Add on no sight strips not allowed.

D. Door Hardware: Attached with theft resistant barrel nuts and shoulder screws.

1. Finish: Chromium plated Zamac.
2. Hinges: Top hinge recessed and interlocked in door, with nylon pin in the plane of the door, through-bolted. Bottom hinge recessed in door, with mating box and pintle nylon cams providing the bearing surface; adjustable to allow door to rest at any position within a 270-degree range; through-bolted.
3. Strike and Keeper: Asi Privacy Indicator latch installed on factory prepared door. Emergency access provided by slotted occupancy indicator.
4. Handicapped Access: Provided via slide latch functionality of Asi Privacy Indicator latch.

5. Coat Hook and Bumper: Manufacturer's standard surface mounted. No tamper resistant screws required.
6. Door Pull: Standard on ADA compartments. Two per ADA door.
7. Fastening Hardware: Theft resistant heads.

E. Mounting Brackets: Provide aluminum continuous U brackets fabricated from heavy-duty 1/8'' thick extruded aluminum (6463-T5 alloy) with a brushed anodized finish, theft resistant barrel nuts and shoulder screws. Each bracket shall have 4 pre-drilled holes spaced evenly across a 53-1/2'' long continuous bracket starting at ¾'' from either end of bracket.

F. Pilaster Shoes: Type 304 Stainless Steel, No. 4 satin finish, 20 gauge. 3 inches (75 mm) high secured to floor w concrete anchors. Shoe to have enclosed bottom and is integral to structure of the compartment.

G. Headrail: Manufacturer's standard, Anodized Aluminum with anti-grip profile.

H. Pilaster Anchors: Floor Anchored/Overhead Braced.

I. Easy Stall shoe system, 1/4 by 2 inch (6 by 52 mm) steel screws attach Easy Stall shoe to floor. Pilaster to be inserted into shoe and secured after height adjusted. Leveling adjustment to be concealed by pilaster shoe. Height/leveling adjustment to be made via machine thread bolts inserted into threaded insert in bottom of pilaster.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Clean surfaces thoroughly prior to installation.

B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

1. Verify dimensions of areas to receive compartments.

2. Verify locations of built-in framing, anchorage, bracing, and plumbing fixtures.

3.02 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Fasten components to adjacent materials and to other components using purpose-designed fastening devices.

C. Adjust pilaster anchors for substrate variations; conceal anchors with pilaster shoes.

D. Equip each compartment door with hinges and door latch.

E. Install door strike keeper on pilasters in alignment with door latch.

F. Equip each compartment door with one coat hook and bumper.

G. Installation Tolerances:

1. Maximum variations from plumb or level: 1/8 inch (3 mm).

2. Clearance between wall surface and panels or pilasters: 1-1/2 inch (38 mm) maximum.

3.03 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors.

B. Adjust adjacent components for consistency of line or plane.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Remove factory protective coverings and clean finish surfaces in accordance with manufacturer's instructions before substantial completion.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 102119 – PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 specification sections, apply to the work of this section.

B. Provide all labor, materials, etc. necessary for the completion of the work of this section as specified or shown on the drawings.

C. Work of this section consists of, but is not limited to, the following:

1. Provision and installation of solid polymer toilet stalls, stall doors, urinal screens, privacy screens, restroom entry partitions and shower partitions.

2. Hardware, etc. for stalls & partitions.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry
B. Section 055000 – Metal Fabrications
C. Section 102813 – Toilet Accessories

1.03 REFERENCES

A. ASTM International:

1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
3. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity

B. NFPA – National Fire Protection Association:

1. NFPA 286 – Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

C. United States Green Building Council (USGBC): LEED Green Building Rating System

1.04 SUBMITTALS

A. All submittals shall be in accordance with Section 013300 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Literature indicating typical panel, pilaster, door, hardware and fastening.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.

C. Shop Drawings:

1. Dimensioned plans indicating layout of toilet compartments.
2. Dimensioned elevations indicating heights of doors, pilasters, separation partitions, and other components; indicate locations and sizes of openings in compartment separation partitions for toilet and bath accessories to be installed in partitions; indicate floor and ceiling clearances.
3. Details indicating anchoring components (bolt layouts) and methods for project conditions; indicate components required for installation, but not supplied by toilet compartment manufacturer.
4. Details showing locations for adequate steel reinforcements of wood blocking in walls to be provided for proper securement of the finished work.

D. Selection Samples: For each finish product specified, one complete set of color selection guides representing manufacturer's full range of available colors, textures and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, texture and pattern.

F. LEED Green Building Rating System: Submit manufacturer's documentation of recycled content, in accordance with LEED credit calculations.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

C. Lay cartons flat, with adequate support to ensure flatness and to prevent damage to pre- finished surfaces.

D. Do not store where ambient temperature exceeds 120 degrees F (49 degrees C).

1.06 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at a minimum of 60 degrees F (15.6 degrees C).

1.07 WARRANTY

A. Manufacturers Standard Warranty: Provide warranty for Solid polymer HDPE Material: Against breakage, corrosion, and delamination for 25 years.

1.08 COORDINATION

A. Coordinate Work with placement of support framing and anchors in walls and ceilings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: ASI Global Partitions, which is located at: 900 Clary Connector; Eastanollee, GA 30538; Tel: 706-827-2700; Fax: 706-827-2710; Email: request info (sales@asi-globalpartitions.com); Web: http://asi-globalpartitions.com

2.02 COMPARTMENTS AND SCREENS

A. Toilet Compartments: Floor anchored/overhead braced solid polymer.

1. Compartment Depth and Width: As scheduled and indicated on Drawings.
2. Door Width: 24 inches (610 mm), minimum; at ADA accessible compartments 36 inches (915 mm) minimum.
3. Height Above Floor: 14 inches (356 mm).
4. Door/Panel Height: 55 inches (1397 mm).
5. Pilaster Height: 82 inches (2083 mm).

B. Privacy and Urinal Screens: Wall hung:

1. Screen Panel Size: 24 inches (610 mm) wide by 48 inches (1219 mm) high.

2.03 SOLID POLYMER TOILET COMPARTMENTS

A. Doors, Panels, Screens, and Pilasters: Single sheet solid, homogenous HDPE plastic material formed from waterproof, non-absorbent, high-density polyethylene resins; mark- resistant self-lubricating surface; edges finished smooth.

1. Material: Solid, homogenous HDPE; 1 inch (25 mm) thick.
2. Rating: Class "B" Fire Rated per ASTM E 84.
3. Material shall be compliant with IBC 2012 or later and must be solid HDPE; foamed material is not allowed. Material shall be NFPA 286 compliant.
4. Edges: 1/4 inch (6 mm) radius machined edges.
5. Heat Sink: Aluminum heat sink, to dissipate heat from incendiary devices used by vandals, attached to bottom of doors and panels.

B. Finish: Pebble-textured homogenous color throughout material. Color as selected by Architect from manufacturer's standard colors. 18 colors available in NFPA286. (Hammered finish available in NFPA286 in metallic silver and bronze color only).

C. Door Hardware: 8 inch X 1/8'' thickness aluminum wrap-around hinge

1. Hinges: Hinges shall be 8 inches x 1/8" thickness and fabricated from heavy-duty 1/8" extruded aluminum (6463-T5 alloy) with a brushed anodized finish with wrap-around flanges, surface mounted and through bolted to doors and pilasters. Hinges operate and are field set with adjustable nylon cams. Cams can be set in 30 degree increments.
2. Latch: Anodized extruded aluminum, with housing, slide bolt and button.
3. Strike and Keeper: 6 inch (152 mm) wrap-around flanges fabricated from heavy-duty extruded aluminum (6463-T5 alloy) with a brushed anodized finish.
4. Coat Hook and Bumper: Non-ferrous, chrome-plated, with black rubber tip for doorstop.
5. Fastening Hardware: Manufacturer's standard, Type 304 stainless steel, No. 4 satin finish, theft-resistant barrel nuts and machine screws.
6. Door Pulls: Non-ferrous, chrome-plated. Standard on ADA compartments. Two per ADA door.

D. Mounting Brackets: Provide aluminum continuous U brackets fabricated from heavy-duty 1/8'' thick extruded aluminum (6463-T5 alloy) with a brushed anodized finish, theft resistant barrel nuts and shoulder screws. Each bracket shall have 4 pre-drilled holes spaced evenly across a 53-1/2'' long continuous bracket starting at ¾'' from either end of bracket.

E. Pilaster Shoes: Type 304 Stainless Steel No. 4 satin finish, 20 gauge. Easy Stall shoe shall be of a one piece design and integral to the mounting system and formed from 304 stainless steel 3 inch (76 mm) high with a No. 4 satin finish. Pilaster shoes are anchored to the pilaster with No. 10 stainless steel, vandal-resistant screws.

F. Headrail: Manufacture's standard anodized aluminum rail with anti-grip profile.

G. Pilaster Anchors: Floor Anchored/Overhead Braced.

1. Easy Stall shoe system. 1/4 by 2 inch (6 by 51 mm) steel screws attach Easy Stall shoe to floor.
2. Pilaster to be inserted into shoe and secured after height adjusted. Leveling adjustment to be concealed by pilaster shoe.
3. Height/leveling adjustment to be made via machine thread bolts inserted into factor installed threaded insert in bottom of pilaster.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Clean surfaces thoroughly prior to installation.

B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

1. Verify dimensions of areas to receive compartments.

2. Verify locations of built-in framing, anchorage, bracing, and plumbing fixtures.

3.02 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Fasten components to adjacent materials and to other components using purpose-designed fastening devices.

C. Adjust pilaster anchors for substrate variations; conceal anchors with pilaster shoes.

D. Equip each compartment door with hinges and door latch.

E. Install door strike keeper on pilasters in alignment with door latch.

F. Equip each compartment door with one coat hook and bumper.

G. Installation Tolerances:

1. Maximum variations from plumb or level: 1/8 inch (3 mm).

2. Clearance between wall surface and panels or pilasters: 1-1/2 inch (38 mm) maximum.

3.03 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors.

B. Adjust adjacent components for consistency of line or plane.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Remove factory protective coverings and clean finish surfaces in accordance with manufacturer's instructions before substantial completion.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 102813 – TOILET ACCESSORIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Cabinet-type toilet accessories.

1. Roval Collection.
2. Profile Collection.
3. Traditional Collection.

B. Toilet accessories.

1. Grab bars.
2. Electric hand dryers.
3. Mirrors.
4. Paper Towel Dispensers
5. Soap Dispensers
6. Toilet Tissue Dispensers
7. Feminine hygiene vendors and disposals
8. Baby changing stations.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry
B. Section 092900 – Gypsum Wall Board
C. Section 093013 – Ceramic Tile
D. Section 102113 – Metal Toilet Compartments
E. Section 102114 – Stainless-Steel Toilet Compartments
F. Section 102119 – Plastic Toilet Compartments

1.03 REFERENCES

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
E. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless-Steel Tubing for General Service 2015a (Reapproved 2019).
F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
H. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings 2018, with Editorial Revision (2021).
I. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium 2017.
J. ASTM C1036 - Standard Specification for Flat Glass 2021.
K. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

L. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2018.
M. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use 2004, with Editorial Revision (2016).
N. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

A. Submit under provisions of Section 013300 – Submittal Procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Shop Drawings:

1. Plans: Locate each specified unit in project.
2. Elevations: Indicate mounting height of each product.
3. Details: Indicate anchoring and fastening details, required locations and types of anchors and reinforcement, and materials required for installation of specified products.

D. Verification Samples: Two sample chips of each specified color and finish.

E. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

F. Quality Assurance Submittals:

1. Printed installation instructions for each specified product.
2. Documentation of Manufacturer's Qualifications, specified in 1.06 of this Section.

G. Closeout Submittals: Warranty, issued and executed by manufacturer, and countersigned by Contractor.

H. All accessories to be type 304 stainless steel and be shown on technical data sheets as such.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum five years documented experience producing products specified.

B. Source Limitations: To the greatest extent possible products shall be provided by a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Ship products in manufacturer's standard protective packaging with vinyl coating on exposed surfaces.

B. Storage and Protection: Store products in manufacturer's protective packaging until installation.

1.08 WARRANTY

A. Manufacturer's standard warranty against defects in product workmanship and materials.

B. Manufacturer's 15-year warranty against silver spoilage of mirrors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: American Specialties, Inc.; 441 Saw Mill River Road, Yonkers NY 10701-4913. ASD. Tel: (914) 476-9000. Fax: (914) 476-0688. Email: infoatamericanspecialties.com. Web: http://www.americanspecialties.com

B. Basis-of-Design Product: Subject to compliance with requirements, provide the electric Dyson Airblade V hand dryers manufactured by Dyson Inc., 1330 W. Fulton St., Floor 5, Chicago, IL 60607; 888-397-6622 www.dyson.com/Airblade or comparable product acceptable to the Architect.

C. Requests for equivalency will be considered in accordance with provisions of Section 013300.

2.02 CABINET-TYPE TOILET ACCESSORIES (ROVAL COLLECTION)

A. Basic Construction Requirements:

1. Doors: Curved design, one piece Type 304, 18 gauge, 0.05 inch (1.27 mm) stainless steel.

2. Cabinets: Type 304, 22 gauge, 0.0312 inch (0.79 mm)stainless steel, trimless; joints welded, sight-exposed welds finished to match sheet finish. Full access back panels.

3. Hinges: Concealed, heavy-duty stainless steel multi-staked piano hinge, full length of cabinet.

4. Locks: Two flush, rimless tumbler locks, keyed alike other toilet accessory locks, with one key for each lock.

5. Exposed Finish: No.4 satin finish, unless noted otherwise.

B. Feminine Hygiene Disposals: Roval Collection by ASI.

1. Surface Mounted Sanitary Waste Receptacle: **ASI Model 20852**. Lid and cabinet are each drawn one piece construction. Lid is secured to the cabinet with a heavy-duty 9/64 in (3.6 mm) multi-staked concealed piano hinge.

C. Feminine Hygiene Vendors: Roval Collection by ASI.

1. Recessed Dual Sanitary Napkin and Tampon Dispenser: **ASI Model 04684**. Dispenses 15 napkins and 23 tampons. Door made of 18 ga type 304 satin finish stainless steel, with two flush tumbler locks. Universal coin mechanism is convertible for 25 cents, 50 cents or FREE (no coin) operation. Coin boxes have different lock and key than doors and collar for surface mounting. Provide and install **ASI Model 04684-9 Surface Mounting Adaptor Collar** with all units supplied.

D. Mirrors: Roval Collection by ASI. (All mirrors to be tempered)

1. Stainless Steel Mirror (Tempered Glass):**ASI Model 20650-B 1836**. The gently radius edges provide added strength and complement the curves of the ASI Roval Collection. Frame

fabricated of 18 ga type 304 stainless steel with satin finish and polished seamless mitered corners. 1/4 in (6.4 mm) thick tempered glass mirror.

2. Stainless Steel Mirror with Integral Shelf**: ASI Model 20655-B 1836**. The gently radius edges provide added strength and complement the curves of the ASI Roval Collection. Mirror frame and 6 in (152 mm) wide curved edge shelf are fabricated of 18 ga type 304 stainless steel with satin finish. Mirror frame has polished seamless mitered corners. 0.25 in (6.4 mm) thick tempered glass mirror.

3. Frameless Mirror: ASI Model 8287-A. Size and location as indicated on drawings. Frameless Mirror shall be fabricated of 1/4" [6.4] polished plate glass and shall comply with ASTM C 1503-01 and government specification No. DD-M-411-C and shall be warranted against silver spoilage for (15) years. Mirror shall be supplied as one piece up to 32 ft² (2.97 m²) and up to 96” x 48” [2438 x 1219] in W x H. Mirrors larger than 32 ft² (2.97 m²)or with linear W or H dim larger than 96” [2438] shall be supplied as multiple pieces.

2.03 CABINET-TYPE TOILET ACCESSORIES (PROFILE COLLECTION)

A. Basic Construction Requirements:

1. Doors: Type 304, 16 gauge, 0.0625 inch (1.59 mm) stainless steel, formed 15/16 inch (23.8 mm) return to wall, with vertical edges eased at 3/4 inch (19 mm) radius; welded corners.

2. Cabinets: Type 304, 20 gauge, 0.0375 inch (0.95 mm) stainless steel, formed 1 inch (25 mm) wide flat perimeter trim four sides; joints welded, sight-exposed welds finished to match sheet finish.

3. Hinges: Heavy-duty stainless steel multi-staked piano hinge, 3/16 inch (5 mm) diameter barrel, full length of cabinet; hinge leaves spot-welded to door and cabinet body.

4. Locks: Flat rimless tumbler locks, keyed alike other toilet accessory locks, with two keys for each lock.

5. Cabinet and Door Finish: No.4 satin finish.

B. Toilet Tissue Dispensers/Holders: Profile Collection by ASI.

1. Surface Mounted Dual Roll Toilet Tissue Dispenser: **ASI Model 20030.** 18g door, 22 gauge cabinet and flush mounted lock. Holds two rolls up to 5-1/4 in (135 mm) dia (1800 sheets). Top roll automatically drops in place when bottom roll done. Type 304 stainless cabinet and mechanism. Theft resistant spindles.

2.04 CABINET-TYPE TOILET ACCESSORIES (TRADITIONAL COLLECTION)

A. Basic Construction Requirements:

1. Doors: 22 ga stainless steel, double pan construction, with 1/4 in (6 mm) thick structural fiberboard core.

2. Cabinets: 22 ga stainless steel, formed perimeter trim with 1/4 in (6 mm) return to wall four sides; joints welded, sight-exposed welds finished to match sheet finish.

3. Hinges: Heavy-duty stainless steel multi-staked piano hinge, 3/16 inch (5 mm) diameter barrel, full length of cabinet; hinge leaves spot-welded to door and cabinet body.

4. Locks: Flat rimless tumbler locks, keyed alike other toilet accessory locks, with two keys for

each lock.

5. Cabinet and Door Finish: No.4 satin finish.

B. Paper Towel Dispensers: Traditional Collection by ASI.

1. Paper Towel Dispenser: **ASI Model 0210**. Dispenses 400 C-fold or 525 multi-fold paper towels without adjustment or adapters. Fabricated of 22 ga stainless steel with Satin finish. Fitted with tumbler lock and heavy duty stainless steel piano hinge.

2. Surface mounted Roll Paper Towel Dispenser: **ASI Model 8522.** Unit dispenses pre-set lengths per cycle from 8 in or 9 in (205 or 230 mm) wide, 800 ft (244 m) long rolls with mechanical dispenser. Three pre-set dispensing lengths.

2.05 TOILET ACCESSORIES

A. Basic Construction Requirements:

1. Doors: 22 ga satin stainless steel, formed hems at sight-exposed edges.

2. Cabinets: 22 ga satin stainless, formed hems at sight-exposed edges; joints welded.

3. Hinges: Stainless steel piano hinge, 3/16 in (4.8 mm) dia barrel, full length of cabinet; hinge leaves spot-welded to door and cabinet body.

4. Locks: Tumbler locks, keyed alike other toilet accessories, two keys for each lock.

B. Custodial Accessories: As manufactured by ASI.

1. Utility Shelf with Mop Holders and Rag Hooks: Type 304 satin stainless. Shelf is 8 in (200 mm) deep with 3/4 in (19 mm) return for rigidity. Mop holders are riveted to strip and rubber cam is ribbed for grasping. Rod and hooks for wet rags included.

a. **ASI Model 1315-4:** 4 mop holders/3 rag hooks, 36 in (915 mm) long.

C. Shower Curtain Rods: As manufactured by ASI.

1. Shower Curtain Hook: **ASI Model 1200-SHU**. Stainless steel hook for rods 1 in (25 mm) and 1-1/4 in (32 mm) dia.

2. Vinyl Shower Curtain: **ASI Model 1200-V**. Flame resistant, anti-bacterial, 8 ga vinyl fabric. Curtain shall be 6 in (150 mm) wider than opening up to 48 in (1220 mm) and 12 in (305 mm) wider than openings exceeding 48 in (1220 mm). Sizes and colors as scheduled or indicated on Drawings.

3. Extra Heavy-Duty Shower Curtain Rod: **ASI Model 1204**. Flanges 3 in (75 mm) dia, 20 ga type 304 satin stainless. 1-1/4 in (32 mm) dia rod, 18 ga type 304 satin stainless tubing. Available in lengths up to 96 in (2440 mm).

4. Folding Shower Seat (Handed): **ASI Model 8206**. Meets ADA Accessibility Guidelines and the needs of the physically disabled and elderly. Seat is 1/2 in (13 mm) thick, one piece solid phenolic, ivory colored. Frame, support legs, flanges, and bracket are type 304 satin finish stainless steel. Features a reversible self-locking mechanism. Seat measures 33 in (840 mm) wide and projects 22-7/8 in (580 mm) from wall.

D. Soap Dispensers: As manufactured by ASI.

1. Horizontal Surface Mounted Soap Dispenser: **ASI Model 9343.** All-purpose valve dispenses liquid, lotion and detergent-type soaps. It has a tamper-resistant refill window with concealed fastening and vandal-resistant hinged filler-top. Capacity: 48 fl. oz. (1.4 L).

E. Towel and Clothes Hooks: Single As Manufactured by ASI.

1. Single Robe Hook: **ASI Model 7308**. Extends 2-5/16 in from wall or door. Suitable for robes, clothing or small bags. Robe Hook shall be type 304 stainless steel alloy 18-8. Wall flange shall lock to wall bracket with stainless steel M5 hex socket set screw concealed on bottom perimeter of flange. Post shall be 22 gauge tubing with formed 18 gauge threaded bracket welded inside end. Hook shall be solid pin. Flange shall be 1/16" (1.5) thick with 3/32" (2.3) thick sides and heavy reinforcement ribs. Post shall be bolted to flange with concealed and locked M6 (Ø1/4") screw. All exposed surfaces shall have satin finish. Wall bracket shall be 18 gauge with embossed ribs for added strength and shall have two (2) mounting slots to accommodate M4 pan head screws (provided) and allow slight installation alignment adjustment. Hex L-key (M2.5) is provided to lock set screw to secure unit to wall bracket

2.06 GRAB BARS

A. Grab Bars:

1. Size: Straight grab bar, lengths as indicated on Drawings.

2. Covers: Snap over flange to conceal screws; type 304 stainless steel, 22 ga, 3-3/16 in (81 mm) dia.

3. Concealed Mounting Flanges: 3-1/8 in (79 mm) O.D. dia with two screw holes and three locking dimples; 1/8 in (3 mm) thick, type 304 stainless steel.

4. Series: 3700 Series by ASI; 1-1/4 in (32 mm) dia handrail with snap-on flange covers.

a. Product: **ASI Model 3700-P Series**, with peened surface.

2.07 ELECTRIC HAND DRYERS

A. Electric Hand Dryers: The electric Dyson Airblade V Electric hand dryer [307174-01 (sprayed nickel LV)].

1. Provide at locations and in quantities as shown on the drawings. If not shown in the drawings, only paper towel dispensers are required.

2. Mounting: Surface mounted on ABS/PBT plastic backplate/mounting bracket; protrudes four inches from wall, no recessing required; ADA compliant.

3. Construction: Polycarbonate casing with anti-microbial [additive in paint]. Anti-microbially integrated external plastics and seals. Anti-tamper M4 exterior pin-hex screws. Water ingress protection to IP24.

4. Color Finish: [Sprayed nickel] finish.

5. Filtration: 99.97 percent particulate efficiency HEPA filter with anti-microbial coating.

6. Operation: Touch-free capacitive sensor activation.

a. Hand dry time: 12 seconds

b. Airspeed at nozzle: 420 mph
c. Operating Airflow: up to 5.28 gal/sec.
d. Rated Operating Noise Power: 79 db(A)

7. Motor: Dyson Digital Motor (DDM), V4 switched reluctance brushless DC type; 92,000 rpm motor speed; less than 0.5 watt standby power consumption.

8. Electrical Requirements: [110-127 V AC, 12 A. 1000 W] Dyson recommends 15 amp circuit.

9. Operating Temperature Range: 0 – 40 degrees C.

10. Standby Power Consumption: Less than 0.5 W.

2.08 NARCOTICS CABINETS: FOR NURSES OFFICE

A. Narcotics Cabinets, **ASI Model 0547**, Stainless steel-Dual door with combination lock:

1. Surface mounted security cabinet for controlled narcotic substances shall be type 304 alloy 18-8 stainless steel of double wall all welded construction.

2. Cabinet shall be 22 gauge and doors shall be 18 gauge. All exposed surfaces shall have satin finish.

3. Doors are attached to cabinet with welded on full length 3/16" diameter [Ø4.8] piano hinges. Outer door has all returns toward inside. Inner door has top & bottom returns turned in and latch edge turned out for enhanced security. Five (5) button combination tumbler locked latches with dead bolts shall hold both doors closed.

4. Two (2) stainless steel 22 gauge satin finish shelves with hemmed edges shall be furnished and spacing shall be easily adjusted by owner using eight (8) track clips provided.

5. Top cover is removable when inner door is opened and may be reattached to bottom when unit is inverted to reverse hand of door swing in the field. Lock programming instructions are provided.

2.09 DIAPER CHANGING STATION

A. Horizontal Recessed Mounted Stainless Steel Baby Changing Station shall be **ASI Model No 9018**, or Horizontal Surfaced Mounted Stainless Steel Baby Changing Station shall be **ASI Model No 9019** as indicated on the Drawings as manufactured by *American Specialties, Inc*.

1. Baby Changing Station shall be horizontal format and shall protrude no more than 4 inches (102 mm) from wall when in retracted position.

2. Unit shall comply with 2010 ADA Accessibility Standards, ASTM F2285-04, and EN 12221-1.

3. Unit shall support a static load of 300 lbs. (136.1 kg) and be tested in excess of 350 lbs. (158.8 kg).

4. Unit shall be fabricated of non-porous plastic (FDA approved HDPE) tested according to ASTM G21 and ASTM G22.

5. Unit shall contain a door facing and wall flange dress trim of satin finished 18 gauge type 304 stainless steel.

6. Unit shall contain a surface mounting collar made from satin finished 22 gauge type 304

stainless steel.

7. No parts of the operating mechanism shall be accessible when unit is open or closed to provide a tamper-resistant and pinch proof user environment.

8. Unit shall have a damped gas spring to assist user in opening and closing bed tray with the use of one hand. Unit shall be provided with one integral heavy-duty bag hook.

9. Unit shall provide a bed-liner dispenser that may be easily converted to a multi-fold towel dispenser with no adapters.

10. Unit shall provide graphics and instructions in four languages on interior back.

11. Unit shall be provided with an adjustable two-part vinyl coated child protection safety-strap mounted with concealed fasteners on high walls of cradle.

12. Entire unit shall be assembled of completely sealed components to provide easy cleaning and no penetration zones to harbor microbes or bacteria.

13. Unit shall mount on standard stud wall dimensions and with proper anchoring may mount on all suitable wall constructions. Mounting fasteners shall be concealed after installation using color matched recess plug-covers supplied.

14. Unit bed tray and back shall be light grey in color and entire unit shall be recyclable at end of usable life. Unit shall be warranted for five (5) years against defects in material or workmanship.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions.

B. Verify reinforcement and anchoring devices are correct type and are located in accordance with shop drawings.

C. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

D. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

E. For electrically-operated accessories, verify that electrical power connections are correct amperage, ready and in the correct locations.

F. Refer to Section 061000 and Section 092900 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install toilet accessories plumb and level in accordance with shop Drawings and manufacturer's printed installation instructions.

B. Locate toilet accessories at heights and locations required for compliance with local accessibility regulations, ICC A117.1 - Accessible and Usable Buildings and Facilities 2017 and the Americans with Disabilities Act.

3.04 CLEANING

A. Remove manufacturer's protective vinyl coating from sight-exposed surfaces 24 hours before final inspection.

B. Clean surfaces in accordance with manufacturer's recommendations.

3.05 PROTECTION OF INSTALLED PRODUCTS

A. Protect products from damage caused by subsequent construction activities.

B. Field repair of damaged product finishes is prohibited; replace products having damaged finishes caused by subsequent construction activities.

END OF SECTION

DIVISION 12 – FURNISHINGS

SECTION 122400 – MANUAL OPERATED ROLLER SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manually operated, roll-up fabric interior window shades including mounting and operating hardware as shown on the drawings.

B. The required applications of roller shades includes the following:

1. All window units, unless otherwise noted.

1.02 RELATED DOCUMENTS

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

B. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 061000 – Rough Carpentry: Blocking for support of window shade hardware.
2. Section 079000 – Joint Sealants: Sealants for perimeter of shade system.
3. Section 092900 – Gypsum Wall Board: Suspended gypsum board ceilings to contain recessed window shade pockets.
4. Section 095000 – Acoustical Ceiling Systems: Suspended acoustical panel ceilings to contain recessed window shade pockets.

1.03 REFERENCES

A. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

B. GREENGUARD Environmental Institute Gold.

C. ANSI/WCMA A100.1-2022. For manual window shades with closed loop bead chains, all shades will meet all current standards mandated by the Consumer Product Safety Commission.

1.04 SUBMISSIONS

A. Comply with requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Manufacturer's data sheets on each product specified, including:

1. Preparation instructions and recommendations.
2. Installation and maintenance instructions.
3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
4. Storage and handling requirements and recommendations.
5. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on

the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one complete set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

H. Standard manufacturer’s defect warranty: Standard manufacturer’s warranty documents indicating compliance with requirements of Section 1.9 below.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years’ experience in manufacturing products comparable to those specified in this section. If manufacturer does not meet minimum experience requirement, please submit life cycle test data showing minimum 2000 complete operational cycles for each year of warranty showing no failure and that shade remains fit for use as an operable shade).

B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use. Show complete manufacturer data (name, location, contact) and certification from manufacturer that the fabrics sourced for this project comply with the test data provided.

C. Mock-Up: Provide a mock-up of one of each type of roller shade assembly specified for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window(s) designated by Architect.

2. Do not proceed with remaining work until mock-up is accepted by Architect.

1.06 DELIVERY, STORAGE AND HANDLING

A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.

B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.

C. Label containers and shades according to Window Shade Schedule.

D. Store products in manufacturer's unopened packaging until ready for installation. Store shades in a well ventilated, dry, approved location, and protect from damage; damage shades due to improper protection during storage shall be rejected and removed from site.

1.07 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.08 PROJECT CONDITIONS

A. Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

B. Prior to shade installation, building shall be enclosed. Interior temperature shall be maintained between 60ºF and 90ºF during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

C. Notify Architect in writing of any conditions that will prevent satisfactory installation of window blinds. Beginning of window blind installation indicates acceptance of conditions and Contract shall bear responsibility for any unacceptable finished installation caused by these conditions.

1.09 WARRANTY

A. Hardware and Shade Fabric: Draper® standard twenty-five-year limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. For convenience and as a basis of required quality, details and specifications have been based on manual operated roller shades as manufactured by Draper, Inc., which is located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425. ASD. Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Web: www.draperinc.com. In no way shall this be construed as limiting competition; products of other manufacturers may be proposed to the Architect, in accordance with the provisions of the Contract.

2.02 MANUAL-OPERATED ROLLER SHADES

A. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Clutch-operated FlexShade® as manufactured by Draper, Inc.

1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.

    a. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon. White or Black color as selected by Architect.

    b. Spring-assist bead chain clutch mechanism (when required): Adjustment-free system includes spring-assist components to reduce lifting forces required to raise the shade. Manufacturer shall provide estimated torque for shade unit. Spring-assist is recommended on estimated non-spring-assist torque above 6 lb.-in; required on shades with an estimated torque higher than 15 lb.-in.

    c. Bead chain loop: Polyester bead chain, Color as selected by Architect.

    d. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.

e. Bead Chain Hold Down: Spring-Loaded Tensioner complying with ANSI/WCMA A100.1-2022 safety standard.

2. Single Roller Configuration:

   a. Mounting:
      1) Universal Mounting brackets.
      2) Endcaps only.
      3) Endcaps and fascia.
      4) Ceiling/Wall Style Headbox.
      5) Recessed Pocket Headbox.

   b. Brackets: Plated stamped steel. Provide size compatible with roller size.
      1) Mounted to ceiling.
      2) Mounted to wall.
      3) Mounted to jamb.
      4) Finish: As selected by Architect.

   c. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
      1) Idler endcap to have optional levelling adjustment.
      2) Endcap covers: To match fascia or headbox color.

   d. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
      1) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
      2) Shape: Square Fascia Panel.
      3) Shape: Reverse Roll Fascia Panel.
      4) Finish: Selected from Manufacturers standard range.

   e. Headbox Ceiling/Wall style: “L” shaped extruded aluminum back and top cover piece with removable extruded aluminum closure and stamped steel endcaps.
      1) Finish: Selected from Manufacturers standard range.

   f. Headbox, Pocket style: Extruded aluminum U-shaped pocket with removable closure and endcaps.
      1) Finish: Selected from Manufacturers standard range.

   g. Type D Shade pocket: Rectangular pocket and endcaps designed for recessed ceiling installation of window shades with ceiling tile lip.
      1) Material: Extruded aluminum with white finish.
      2) Size: 5 inches (127 mm) wide by 5-3/8 inches (137 mm) high.
      3) Closure Panel:
         a) 1-1/2 (38 mm) closure dimension, recommended for bead chain operation.
      4) Pocket End Cap Kit: Metal endcaps with 7/8 inch (22 mm) lip for support of acoustical ceiling panel.
      5) Corners: Welded one-piece aluminum sections connecting to and matching pockets to allow continuous shade recess at ceiling corners.

3. Dual Roller Configuration:

   a. Mounting:
      1) Dual roller endcaps. Endcaps for surface or recessed mounting of dual roller window shades. 1028 steel stamping.
         a) Idler endcap to have optional levelling adjustment.

2) Dual roller fascia. Endcaps with fascia designed for surface mounting of dual roller window shades.
    a) Endcaps: 1028 steel stamping.
        a. Idler endcap to have optional levelling adjustment.
    b) Fascia: L-shaped cover of extruded aluminum, .060 wall. Assembly snaps onto endcaps without exposed fasteners.
    c) Size: Determined by manufacturer based on fabric size, weight, and thickness and window opening size.
    d) Finish: Selected from Manufacturers standard range.
3) Dual roller with pocket headbox. Pocket and endcaps designed for recessed ceiling installation of dual roller window shades.
    a) Endcaps: 1028 steel stamping.
        a. Idler endcap to have optional levelling adjustment.
    b) Material: 18-gauge steel.
    c) Size: Determined by manufacturer based on fabric size, weight, and thickness and window opening size.
    d) Finish:
        a. White Inside/Grey Outside with white ceiling flange.
        b. Grey Inside/White Outside with white ceiling tile flange.
    e) Closure Panel Aluminum, without exposed fasteners:
    f) Front Tile Flange.
    g) Left Tile Flange.
    h) Right Tile Flange.
    i) Pre-drilled Mounting Holes.
    j) Pre-drilled Ventilation holes.
    k) Aluminum "L" Channel
    l) Aluminum "U" Channel
    m) Aluminum "H" Channel
    n) Channel Liners
4) Dual roller with ceiling/wall headbox. Fascia, L-shaped top/back, and endcaps designed for wall or ceiling installation of dual roller window shades.
    a) Endcaps: 1028 steel stamping.
        a. Idler endcap to have optional levelling adjustment.
    b) Fascia: L-shaped cover of extruded aluminum, .060 wall. Assembly snaps onto endcaps without exposed fasteners.
    c) Size: Determined by manufacturer based on fabric size, weight, and thickness and window opening size.
    d) Finish: Selected from Manufacturers standard range.

4. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Minimum roller diameter 1.5 inches. Tube diameters less than 1.5 inches shall not be acceptable unless manufacturer provides deflection analysis showing deflection limited to <= width(inches)/700 at 1.5 X design load.

5. Fabric to tube attachments: LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.

6. Shade slat:

    a. Closed pocket elliptical slat: 1 inch (25 mm) aluminum elliptical slat inside of a 1-5/8 inch (41 mm) pocket with heat sealed ends.

7. Light Gap Reduction Channels.

a. Aluminum L Angle – 3/4 inch (19 mm) by 1 inch (25 mm).
b. Aluminum L Angle -1 inch (25 mm) by 2-3/4 inches (70mm).
c. Vinyl L Angle-1-1/2 inches (38 mm) by 3/4 inch (19 mm).
d. U Channel -1 inch (25 mm) by 2-1/2 inches (64 mm).
e. H Channel – 1 inch (25 mm) by 5 inches (127 mm).

2.03 FABRIC

A. Light Filtering Fabrics:

1. All specified fabrics shall meet or exceed the following:

a. ASTM E-84: Flame spread rating not to exceed 0-25; smoke development rating not to exceed 450.
b. Federal Standard 191 Method 5903.
c. New York State Uniform Fire Prevention and Building Code.
d. Flame-resistance two seconds after flame maximum with average char length of not more than 2-1/2” in. both warp and fill directions. Must meet U.S. Government specification CCC-C521E, Type II Fiberglass (Opaque).
e. NFPA 701: Standard Methods of Fire Tests For Flame Propagation of Textiles and Films.

2. SheerWeave® Series SW2500 by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave.

a. Fire rating: California U.S. Title 19 (small scale),
b. NFPA 701 TM#1 (small scale),
c. NFPA 101 (Class A Rating),
d. IBC Section 803.1.1 (Class A Rating),
e. BS 5867 Part 2 Type B Performance,
f. NFPA 701 TM#2 (large scale),
g. CAN/ULC-S 109 (large and small scale),
h. CAN/CGSB2-4.162-M80. Bacteria and fungal resistance:
i. ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273,
j. UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives.
k. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC,
l. US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant.
m. 1 percent open, .024 inches thick. 16.39 oz/square yard.

3. Provide complete range of shear weave fabrics available in colors and density.

B. Room Darkening Fabrics

1. Opaque

a. PVC Coated Fiberglass

1) SheerWeave® Series SW7100 Blackout by Phifer®: PVC-coated Fiberglass laminated with a 2-ply PVC film.
a) Fire rating: NFPA 701 TM#1 (small scale),
b) NFPA 701 TM#2 (large scale),
c) BS 5867 Part 2 Type B Performance,
d) CAN/ULC-S 109 (large and small scale),

e) NFPA 101 (Class B Rating), IBC Section 803.1.1 (Class B Rating). Bacterial and fungal resistance:
f) ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273,
g) UL GREENGUARD® Mold and Bacterial Standard ASTM 6329; Style 2000 face includes Microban® antimicrobial additives.
h) Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe Use: RoHS/Directive 2002/95/EC,
i) US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant.
j) Opaque, .025 inches thick, 21.6 oz/square yard, opaque.

C. Color and pattern: As indicated in Finish Schedule on Drawings or as selected by Architect from manufacturer's standard range.

D. All hardware shall be of heavy-duty quality and shall be chrome plated.

E. The finished shade shall be of a width sufficient to adequately cover the roller. None of the barrel shall be exposed at the end of the roller.

F. Installation Brackets: shall be corrosion-resistant metal, free from burrs and rough edges.

G. Provide (1) length of operable roller-shade per each section of window unit or as directed by the Architect. Roller shade length shall not exceed 60", provide multiple roller shade sections for lengths that exceed 60".

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

B. Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.

C. Coordinate installation of recessed shade pockets with construction of suspended acoustical panel ceilings specified in Section 095000.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.

C. Shade pockets:

1. Install shade pockets prior to installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
2. Install shade pockets in conjunction with installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
3. Install corner pieces securely and in alignment with pockets.
4. Install pocket ends securely and in alignment with pockets.
5. After interior construction is essentially complete, install shade and operating mechanism in pocket.

D. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.

1. Fascias.
2. Closure panels.
3. Endcaps

E. Install headbox, side channels, and sill channel with sealant specified in Section 079200 - Joint Sealants to eliminate light leaks at perimeter of shade system.

F. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

G. Provide adequate clearance to permit unencumbered operation of sash hardware.

H. Divisions between shades are permitted only at mullions by continuous windows or openings where more than on blind for one opening occurs, unless otherwise indicated.

I. Isolate metal parts from concrete and mortar to prevent galvanic action. Use tape or thick coating or other means recommended by manufacturer to effect separation.

J. Clean finished installation of dirt and finger marks. Leave work area clan and free of all debris.

3.04 TESTING AND DEMONSTRATION

A. Test window shades to verify that operating mechanism and other operating components are functional. Correct deficiencies.

1. Chain and clutch.

B. Demonstrate operation of shades to Owner's designated representatives.

3.05 PROTECTION

A. Protect installed units to ensure their being in operation condition, without damage, blemishes, or indication of use at completion of project. Repair or replace damaged units as directed by Architect.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 12 – FURNISHINGS

SECTION 123213 – WOOD CASEWORK AND CLASSROOM WARDROBE UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS and SECTIONS

A. Drawings and General Provision of Contract, including General Conditions, Supplementary Conditions (if applicable), and Division 01 - Specification Sections, apply to work of this Section.

B. The following sections, when included in the Project Manual, are related to the work of this section:

1. Section 061000 – Rough Carpentry
2. Section 062000 – Finish Carpentry
3. Section 096519 – Resilient Flooring
4. Section 220500 – Basic Materials and Methods
5. Section 230500 – Basic Materials and Methods
6. Section 260500 – Basic Materials and Methods

C. This section includes, but is not limited to:

1. Student wardrobe units and Teacher's storage units.
2. Countertop assemblies with backsplash and casework.
3. All filler panels, frame units, scribe strips, wall strips, accessories, etc.
4. Electrical fixtures and accessories
5. Utility-space closure panels between base cabinets and at end exposed ends of utility spaces
6. Utility-space framing at backs of base cabinets and between backs of base cabinets
7. Related equipment

1.02 QUALIFICATIONS

A. All wood casework covered by this specification and accompanying drawings shall be manufactured or furnished by one manufacturer and supplied under his direction to eliminate any divided responsibility.

1.03 QUALITY ASSURANCE

A. Products of Campbell Rhea are specified as a basis of design, quality, and layout. The specifications and drawings define and show the material or manufacturer is specified, it is not the intent to discriminate against any product of another manufacturer. However, it is the intent of this specification to provide for the Owner a quality, functional installation of wood casework, and to exclude inadequate or inferior wood casework.

B. Manufacturer Qualifications: Not less than five (5) years experience in the actual production of specified products.

C. Installer Qualifications: Firm with min. five (5) years experience in installation or application of systems similar in complexity to those required for this project.

D. Mock-Up: Provide a mock-up for evaluation of fabrication techniques and application workmanship.

1. Installation in area designated by Architect.
2. Do not proceed with remaining work until installation is approved by Architect.

1.04 WORK BY CASEWORK MANUFACTURER/CONTRACTOR

A. Furnishing, delivering to the building, uncrating, setting in place, leveling, and anchoring all casework and equipment listed in the specifications or equipment schedule and/or shown on the drawings.

B. Furnishing plumbing fixtures (faucets, gas cocks/turrets, side mount eyewashes, etc.) and fittings as defined in the specifications and/or as shown on the drawings, complete with tank nipples and lock nuts for mounting fixtures and fitting on tops or curbs. Installation will be by other respective trades as part of their final connections.

C. Furnishing electrical service fixtures directly attached to the casework or equipment as defined in the specifications, equipment list, and/or shown on the drawings. Fixtures supplied only, not attached or assembled. Installation will be by other respective trades as part of their final connections.

D. Furnishing and installing sink bowls and cup sinks, complete with required overflows, plugs, strainers and tail pieces as defined in the specifications, equipment list, and/or shown on the drawings. Final connections of drain piping and venting will be by other respective trades.

E. Furnishing and installing filler panels and scribes as required for finished installation.

F. Removal of all debris, dirt, and rubbish accumulated as a result of installation of this equipment, leaving premises broom clean and orderly.

G. Store products in manufacturers unopened packaging until project conditions are ready for installation.

H. Factory cut out for all sinks, core drilling for all services and grommets in epoxy resin tops.

1.05 WORK BY OTHERS

A. Furnishing, installing, and connecting of all service lines, drain lines, piping, and conduits, in service turrets or tunnels through, under, or along the backs of working surfaces, and in reagent racks above countertops as required by specifications and/or drawings.

B. Furnishing, installing, and connecting all vents, revents, steam fittings, and special plumbing fixtures or piping to meet local codes, even though not specifically called for in the specifications and/or shown on the drawings.

C. Furnishing and installing of all rigid or flexible conduit, wire, pulling of wire, fittings, and special electrical equipment and accessories, including boxes, receptacles, and flush plates sent loose. Included are those in box curbs or tops, which are not installed at equipment contractor's plant due to inconvenience of shipping. All shall be in accordance with local codes even though not specifically called for in the specifications and/or shown on the drawings.

D. Providing all framing and reinforcements of walls, floors, and ceilings necessary to adequately support the equipment and all bucks and plaster grounds required for proper installation of equipment.

E. Unless otherwise noted on drawings, all perimeter rubber cove base.

1.06 SUBMITTALS

A. Submit the following in accordance with General Conditions of contract specifications and Specification Section 013300 – Submittal Procedures.

B. Manufacturers product data sheets on each product to be used, including,

1. Test reports certifying that the casework finish complies with SEFA-8 standards for chemical and physical resistance performance requirements.
2. Performance test reports from an independent testing lab on each specified top material.
3. Preparation instructions and recommendations
4. Storage and handling requirements and recommendations
5. Installation instructions.
6. Operation and maintenance data

C. Shop Drawings: Include plans, elevations, sections, details and attachments to other work.

1. Indicate locations of blocking and reinforcements required for installing wood casework.
2. Indicate locations and types of service fittings, together with associated service supply connection required.
3. Include details of utility spaces.
4. Include indicators of exposed conduits, if required, for service fittings.
5. Indicate locations of and clearances from adjacent walls, doors, windows and other building components, and other wood casework.
6. Include coordinated dimensions for equipment specified in other Sections.
7. Include dimensioned utility rough-in plans.
8. Include countertops showing sizes, shapes, edge and backsplash profiles, cutouts for plumbing fixtures and methods of joining.

D. Selection Samples: Include plans, elevations, sections, details and attachments to other work.

1. Samples for initial selection purposes of manufacturers color charts showing the full range of colors, textures and patters for each type of material included in this specification.

2. Samples for verification purposes must be based on the following specifications and not a “manufacturers standard” product. Upon request of the architect, samples must be submitted within thirty (30)-days and may be held until project completion. Samples that may be required are as follows:

a. Full size base cabinet with door and drawers – 24” x 22”w x 36”h.
b. Full size upper cabinet with solid hinged door – 24” x 12”d x 30”h.
c. 12”x12” countertop

E. Certificate of Origin: Manufacturer must supply with first submittal, an example of their Certificate of Origin declaring casework is wholly manufactured and assembled in the United States.

1.07 MAINTENANCE AND OPERATING INSTRUCTIONS

A. The Contractor shall include in his/her bid the cost of providing a technically qualified representative for a period of one (1) day to thoroughly instruct the Owner's personnel in correct procedures of operating and maintaining this contract.

1.08 PROJECT CONDITIONS

A. For delivery and installation of casework and equipment, building conditions shall comply with the following AWI Standard 1700-G-3 and 1700-G-4:

1. Flooring required to be placed under casework and equipment installed.
2. Wood or metal blocking (wall grounds) installed within partitions to allow for immediate installation upon delivery.
3. Overhead mechanical, electrical and plumbing rough-in work is complete.

4. Wet operations complete prior to delivery.
5. Ceiling grids (with or without ceiling tiles), overhead soffits, ductwork and lighting installed.

1.09 WARRANTY

A. Casework Manufacturer Warranty: 3 years from date of delivery. Warranty is for the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly investigate and address said deficiencies.

1. Defects in materials and workmanship.
2. Deterioration of material and surface performance below minimum SEFA 8 standards as certified by independent third party testing laboratory.
3. Within the warranty period, the manufacturer shall repair or replace defective casework.

B. Casework manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods. Casework manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor. Casework manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of casework; and, shall not be liable for incidental or consequential damages, losses of or expenses, resulting from the use of their products.

1. The warranty with respect to products from another company sold by the casework manufacturer is limited to the warranty extended by that other company, but in no case be less than the duration stated in Specification Section 017000.

C. Casework manufacturer shall provide, with close-out documents, a Certificate of Warranty for products provided.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Specification: CampbellRhea, which is located at: 1865 N. Market St.; Paris, TN 38242; Tel: 731-642-4251; Fax: 731-642-4262; Web: www.campbellrhea.com.

1. Acceptable alternate manufacturers:

a. Sheldon Laboratory Systems
b. Thermo/Fisher-Hamilton
c. Or as approved by Architect and/or Owner

B. Product Designations: Drawings indicate sizes and configurations of wood casework by referencing designated manufacturer's catalog numbers. Other manufacturers' wood casework of similar sizes, similar door and drawer configurations, and complying with the Specifications, including certification to SEFA-8 standards for construction and chemical resistance, may be approved for substitution.

2.02 CONSTRUCTION

A. Solid lumber and wood veneer on plywood core.

B. Cabinet Finish, Interiors and Exteriors Match Finished:

1. Wood Species: Oak.
2. Finish: As selected by the Architect. Interior finish and color to match exterior.

C. Drawer Styles:

1. Signature Drawer Styling: Drawer fronts are 13/16 inch (20.6 mm) thick solid lumber and have a squared back edge and slight radius to the front edges. Drawers have horizontal grain.

D. Door Styles:

1. Signature Door Styling: Doors have 3/4” inch x 1-1/2” solid lumber stiles and rails with a squared back edge and slight radius to the front edges framing a particleboard core with vertical grain wood veneer face and back.

E. Door and Drawer Hardware Style:

1. Drawer and door pulls: AL-3: Extruded aluminum bow rod design.

2. Hinges: Heavy-duty, institutional type, 5-knuckle hospital tipped, made from 0.083 inch (2 mm) thick chrome plated steel. Hinge is semi-concealed, 2 3/4 inches (70mm) high and has off-set wings; each wing has 5 screw holes for the door leaf and 4 screw holes for the case leaf, two of which are slotted for adjustability. Hinges are attached with Euro screws.

3. Latching Handle: Latching handle CP LH-1 is chrome plated, 4 1/4 inches (108 mm) long and streamline in design. Handle operates with 1/4 turn. Double door cases have latching handles on the right door and dummy handles on the left door. A three point latching system provides a positive engagement at the top and bottom of the door with tapered aluminum rods, which pull the door snug when they engage plastic strike plates. The rods are 5/16 inch (8 mm) in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate, which engages the side of the case, or latches behind the left door on cases with double doors.

4. Locking Handle: Chrome plated locking handle is a latching handle with a lock mechanism incorporated into the handle head. On double door cases, the left door has a dummy handle, and the right door has the locking handle. Lock is laboratory grade with a 5-disc tumbler mechanism with a brushed chrome face. Tumblers and keys are brass, while the plug and cylinder is die cast zinc alloy. There are 500 key changes standard. Locks are keyed differently, master keyed and furnished with 2 keys per lock. Locks and corresponding keys are alpha-numerically coded for a quick match.

5. Locks; Removable core standards: Lock CP SL-1 is laboratory grade, cylinder cam lock, with a 5-disc tumbler mechanism with a chrome plated face. Tumblers and keys are brass, while plug and cylinder is die cast zinc alloy. A 180-degree turn of the key moves the lock cam into, or out of, a slot cut to receive it. There are 500 key changes standard. Locks are keyed differently, master keyed and furnished with 2 keys per lock. Locks and corresponding keys are alpha-numerically coded for a quick match. Lock CP SL-1 is equipped with a removable core, keying control. With the use of a control key, the key core of the lock assembly can be removed and a new key core inserted, changing the entire locking system in a matter of minutes. Key cores can be held out of the lock assembly until the project is completed, removing the security risk of lost or stolen keys during installation and construction. Casework manufacturer shall provide control keys and replacement cores. Locks shall be furnished on all doors, drawers, etc. unless otherwise noted. Individual rooms shall be keyed alike, each room shall be keyed differently.

6. Drawer Slides: Full Extension: Drawer slides are zinc plated, cold rolled steel, heavy-duty with a 150 lb. load capacity. They are equipped with steel ball bearings for smooth effortless operation. Slides have automatic positive stop to prevent drawer's accidental removal, but allow for quick removal without tools.

7. File Drawer Slides: FD-1: Zinc plated, cold rolled steel, heavy-duty, side mounted, and have a 125 lbs (56.25 kg) load capacity. They are equipped with heavy-duty, ball bearing nylon rollers for smooth effortless operation. Slides are full extension with a positive stop, and a trigger finger release.

2.03 MATERIALS

A. Oak Lumber: Grade FAS or better, air-dried and kiln dried to 6 percent moisture content, then tempered to 7 to 8 percent prior to fabrication. Lumber exposed to view, is free of stains, splits, shakes, season checks and other similar defects. Other hardwoods are grade FAS or better, air dried to 6 percent moisture content, then tempered to 7 to 8 percent prior to fabrication. Other hardwoods are used in semi-exposed, or unexposed, areas and comply with NHLA grading for FAS or better lumber.

B. Oak Plywood: Plywood is rotary cut, select grade A-1 cross-banded, and has a veneer core. The 1 inch (25 mm) or 3/4 inch (19 mm) plywood is a minimum of 7-ply, 1/2 inch (12 mm) is a minimum of 5 ply, 1/4 inch (6 mm) is minimum of 3 ply, and 3/32 inch (2.4 mm) is 3-ply. Other hardwood plywood is sound grade, has a solid core and is suitable for semi-exposed or unexposed areas. All plywood shall be CARB Phase 1 compliant.

C. Hardboard used in drawer bottoms and unexposed backs, consists of super-refined wood fibers and chips, highly compressed into a hard, dense, 1/4 inch (6 mm) thick, homogeneous sheet, faced with wood grain pattern melamine on the exposed face. Physical properties: Average MOR is 5,000 lbs/sq inches (3.5 kgf/sq mm); density is 48 lbs/cu ft (0.6 kg/cu m); and MOE of 500,000 psi (350 kgf/sq mm). All hardboard shall be CARB Phase 1 compliant.

2.04 FABRICATION

A. Units and configurations designated for accessibility by users shall comply with ATBCB ADAAG (ADA standards).

B. Design, material and construction of casework, shelving and tables shall comply with SEFA 8 performance and resistance standards.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for its intended use.

D. Base Cabinets: Base cabinets shall have a 2 1/4 inches by 1 inch, solid hardwood horizontal front top frame member and 2 1/8 inches by 1 inch, solid hardwood horizontal rear and side top frame members. Front intermediate rails are 3/4 inch by 2 1/2 inches solid wood. Back intermediate rails are furnished only when drawer separators are specified. Exposed exterior backs are 3/4 inch (19 mm) plywood. Cabinets with exposed interiors but unexposed exteriors have 1/4 inch plywood backs. Cabinets with unexposed interiors and exteriors have 1/4 inch thick hardboard with wood grained melamine face backs. Exposed end panels are 3/4 inch (19 mm) plywood. Unexposed end panels are 3/4 inch hardwood plywood. End panels with unexposed interior and unexposed exterior are 3/4 inch (19 mm) hardwood plywood. Bottom, shelves, and dividers in cabinets with exposed interiors are 3/4 inch plywood; with unexposed interiors is 3/4 inch hardwood plywood. All intermediate cabinet shelves shall be 1 inch (25mm) finished plywood. Exposed edges of front top horizontal frame and intermediate rail members; end panels, bottom, shelves, and dividers are edged with 1/8 inch, solid wood. Drawer separators, furnished only when specified, are 1/4 inch thick hardboard with wood grained melamine face.

E. Cabinet Construction: Cabinet construction shall have bored, doweled, dadoed, glued and screwed construction. Cabinets are enclosed without the use of common partitions. A full horizontal, mortise, tenon and glued, top frame is bored, doweled, glued, and reinforced with six (6) screws into the

cabinet. Intermediate front rails and bottom rear horizontal parting rails are provided as required. Separators, where specified, are let into routed intermediate rails. Backs are recessed and encapsulated into dadoed end panels then screwed into the top and bottom case members. A standard enclosed toe space, 2-1/4 inches (57 mm) by 4 inches (102 mm) high, is provided, with toe rail bored, doweled and glued to end panels; however, casework cabinets, when in a library assembly such as a circulation desk, will have an enclosed toe space 2-1/4 inches (57 mm) deep by 6 inches (152 mm) high. Shelves are supported on heavy-duty, laboratory grade, twin pin plastic shelf clips, which fit into two double rows of holes drilled 1-1/4 inches (32 mm) on centers, in the case end panels for maximum shelf adjustability.

F. Wall and Upper Cases: Wall and upper cases shall have a 1 inch (25 mm) plywood top and bottom panel. Adjustable shelves are 1 inch (25 mm) finished plywood in cases with exposed interiors and 1 inch (25 mm) hardwood plywood in cases with unexposed interiors. Backs are 1/4 inch (6 mm) finished plywood in cases with exposed interiors and 1/4 inch (6 mm) thick hardboard with melamine face in cases with unexposed interiors. End panels in cabinets with exposed interiors are 3/4 inch (19 mm) finished plywood; end panels in cabinets with unexposed interiors are 3/4 inch (19 mm) hardwood plywood. Exterior hanger rails are 4 inches (102 mm) by 3/4 inch (19 mm) hardwood plywood.

G. Tall Cases: Top panels in tall cases with exposed interiors are 1 inch (25 mm) hardwood plywood; tall cases with unexposed interiors have top panels of 1 inch (25 mm) plywood. Bottom panels in tall cases with exposed interiors are 3/4 inch (19 mm) hardwood plywood; and unexposed interiors have 3/4 inch (19 mm) plywood. Interiors, whether exposed or unexposed, are stain color matched to the exterior finish. Adjustable shelves are 1 inch (25 mm) thick hardwood plywood if exposed; 1 inch (25 mm) plywood if unexposed. Shelves are edged with 1/8 inch (3 mm) solid hardwood edging. Backs in tall cases with exposed interiors and exposed exteriors, are 1/4 inch (6 mm) hardwood plywood. Tall cases with unexposed interior or exterior backs have 1/4 inch (6 mm) hardboard melamine color stain matched to the interior. End panels in tall cases with exposed end panels have 3/4 inch (19 mm) hardwood plywood. End panels in cases with unexposed end panels have 3/4 inch (19 mm) plywood. All exposed edges of hardwood plywood components and plywood components are edged with 1/8 inch (3mm) solid hardwood edging. Tall cases have two exterior hardwood plywood cross rails, 4 inches by 3/4 inch (102 mm x 19 mm). Tall cases are rigidly constructed, integral units with the strongest, most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each case is completely enclosed without the use of common partitions and has flush construction with overlapping doors to provide a dust resistant interior. The top panel is bored, doweled and glued into end panels; and the bottom panel is bored, doweled and glued into end panels and glued and screwed to the back. Additional back cross rails are provided as required. Backs are recessed and encapsulated into dadoed end panels and screwed to the top and bottom tall case members. An enclosed toe space 2-1/4 inch by 4 inches (57 mm by 102 mm) is provided with toe rail securely bored, doweled and glued to end panels and bottom panel. Adjustable shelves shall be be 1 inch (25mm) finished plywood and are supported on heavy-duty laboratory grade, twin pin plastic shelf clips, which fit into two rows of holes drilled 1-1/4 inches (32 mm) on centers in the end panels, for maximum shelf adjustability.

H. Drawers: Front is 13/16 inch (20.6 mm) thick hardwood lumber. Drawer faces are screwed to the face of a full drawer box. Drawer box front, sides and back are 1/2 inch (12 mm), 9-ply laminated hardwood plywood, FSC PURE and CARB Phase 1 compliant. Drawer bottom is 1/4 inch (6 mm) thick hardboard with wood grained melamine face. All four corners of the drawer are dovetailed and glued. The top edges of drawer box are radiused. Drawer bottom is let in on four sides, and securely glued underneath with a continuous bead of glue around the perimeter of the drawer bottom. In cabinets 24 inches or less in width, drawers have one pull. In cabinets over 24 inches wide, drawers have two pulls.

I. Hinged Doors:

1. All Doors have 3/4” inch x 1-1/2” solid lumber stiles and rails with a squared back edge and

slight radius to the front edges framing a particleboard core with vertical grain wood veneer face and back.

2. Hinged solid doors 48 inches (1219 mm) or less in height, 3/4 inch (19 mm) thick and overlap the opening on all sides. Doors have one pull. Door has two heavy duty, institutional type, and 5-knuckle hinges. Doors are secured by a friction roller catch and a metal strike plate.

3. Hinged solid doors, over 48 inches (1219 mm) in height, are 3/4 inch (19 mm) thick and overlap the opening on all sides. Single doors and right door of double doors have a latching handle. A three point latching system provides single doors and right door of double doors positive engagements at the top and bottom of the door with tapered aluminum rods, which engage plastic, strike plates and pull the door snug. The rods are 5/16-inch (8 mm) in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate, which engages the side of the case, or latches behind the left door on cases with double doors and securely hold the door shut. Right door of double doors lap over the machined integral astragal on left door in lipped styles; square edged styles have an applied astragal on the left door. Doors have four hinges. On double doors left door is additionally secured with two friction roller catches with metal strike plates.

4. Hinged glazed doors, 48 inches (1219 mm) or less in height, have a solid wood frame 1 1/16 inches (27 mm) by 3 inches (76 mm) with glass panel. Doors overlap opening 1/4 inch (6 mm) on all sides. The frame joints are bored, doweled and glued. The balance of the door is glass. Right door of double doors lap over the machined integral astragal on left door in lipped styles; square edged styles have an applied astragal on the left door. Doors have one pull, two hinges and are secured by friction roller catches with metal strike plate.

    a. Glass is tempered safety glass is specially heat-treated glass, 1/4 inch (6 mm) thick with a minimum of 88 percent clarity.

J. Sliding Doors:

1. All doors to be fully framed on all four sides with solid hardwood lumber 1 1/8” wide framing a particleboard core and vertical grain wood veneer face and back with crossbands.

2. Sliding solid doors are 13/16 inch (20.6 mm) thick with squared edges and operate in an overhead aluminum sliding door track assembly with adjustable nylon roller hangers. Doors are secured at the bottom of the cabinet with two plastic guides per door that operate in recessed, channels. Each door has one recessed pull with finger grip. Pull is located on outside edge of the door face. Lock is furnished when specified.

3. Sliding glazed doors, 48 inches (1219 mm) or less in height, have a 1 1/16 inches (27 mm) by 3 inches (76 mm), solid wood frame with 1/8 inch (3 mm) thick DSB glass. Door frames have joints bored, doweled and glued. The balance of the door is glass. Doors operate in an overhead aluminum sliding door track assembly with adjustable nylon roller hangers. Doors are secured at the bottom of the cabinet with two plastic guides per door, which operate in recessed channels. Each door has one pull recessed nickel-plated metal pull with finger grip. Pull is located on outside edge of the door face. Lock is furnished when specified.

    a. Glass is tempered safety glass is specially heat-treated glass, 1/4 inch (6 mm) thick with a minimum of 88 percent clarity.

4. Sliding glass doors are 1/4 inch (6 mm) thick tempered safety glass. Doors have polished vertical edges and swiped horizontal edges. Doors operate in sliding aluminum door track assembly, which has an aluminum track at the bottom, and an aluminum channel mounted at the top of the cabinet. The glass rests in aluminum shoes with nylon rollers. The top swiped edge of the glass is fitted with plastic glide clips to assure smooth movement in the channel.

Each door has one two-piece recessed round pull. Pull is located on outside edge of the door face. Lock is furnished when specified.

K. Book Shelving: Book shelving top panels are 3/4 inch (19 mm) plywood with a 2-1/2 inch (63 mm) high front fascia of solid hardwood. Bottom panels in cases with exposed interiors are 1 inch (25 mm) plywood. Adjustable shelves in are 1 inch (25 mm) plywood, with solid hardwood edge band on front and back edges. Backs are 1/4 inch (6 mm) plywood. End panels are 1 inch (25 mm) plywood. Exposed edges of end panels, dividers and shelves are edged with 1/4 inch (6 mm) solid wood. Intermediate panels are 1 inch (2 5mm) hardwood plywood. Book shelving is rigidly constructed with full top and bottom frames bolted to end and intermediate panels. Back panels are encapsulated in grooves in end panels and top panel. Book shelf units have adjustable shelves supported by heavy duty chrome plated steel pins recessed in shelf, 1-1/4 inch (32 mm) o.c.

2.05 FINISHES

A. Wood Cabinets: Exterior and interior surfaces of cabinets receive the full finishing process consisting of baked on: specified NGR stain, two coats of protective moisture resistant sealer and two applications of a topcoat of clear catalyzed chemical resistant conversion varnish.

1. Interior Surfaces: The unexposed interior surfaces of cupboards, wall cases, upper cases, and tall cases must match exterior color and receive stain (color coat), a protective coat of moisture resistant sealer, and two applications of a clear, catalyzed, chemical resistant conversion varnish topcoat.

2. Other Surfaces: Unexposed surfaces such as unexposed end panels, unexposed backs, drawer sides and drawer bottoms are processed through standard finishing steps and receive a baked on protective coat of moisture resistant sealer, baked on clear catalyzed chemical resistant conversion varnish, but no stain (color coat).

3. Finish shall comply with SEFA-8 resistance standard acceptable levels for casework surfaces. An independent 3rd party testing facility's written certification must be provided to establish that final finish has no more than three, SEFA-8 "Level 3" conditions.

4. Any deviations from the specified finishing procedures will be considered defective Work and rejected by the Architect.

2.06 CABINET HARDWARE

A. Provide wood casework manufacturer's standard finish, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Lock GL-1 is ratchet type glass door lock, with a disc tumbler mechanism and a polished nickel plate finish. The ratchet bar adjusts from 1 inch (25 mm) to 3 3/8 inches (86 mm). Two keys are provided; master keying is not available. Locks are furnished only when specified.

C. Friction roller catch is zinc plated steel catch with a spring cushioned; polyethylene roller, and a metal strike plate. Screw mounted catches and strike plate have slotted holes for adjustability.

D. Sliding door track assembly DT-1 has an overhead aluminum track and adjustable, nylon roller hangers. The lipped edge of the upper aluminum track prevents rollers from jumping track. Two hard plastic guides are mounted on the bottom interior of the door and operate in recessed channels.

E. Sliding glass door track assembly GT-1 has an aluminum bottom track, and an aluminum channel mounted at the top of the cabinet. The glass rests in aluminum shoes with nylon rollers, which operate in the bottom track. The top swiped edge of the glass is fitted with plastic glide clips to assure smooth movement in the channel.

F. Shelf clips are made from clear polycarbonate and are laboratory standard grade. Clips have double, 3/16 inch (5 mm) diameter pins and are equipped with shelf lock hold down tabs for 3/4 inch (18 mm) or 1 inch (25 mm) thick shelves.

G. Sliding door lock shall be 5-disc tumbler mechanism with a dull chrome plated face. Tumblers and keys are brass, while plug and cylinder are die cast steel. Pushing in on the lock while turning the key, engages a lock bolt into the strike plate; a turn of the key, unlocks the bolt. There are 200 key changes standard. Locks are keyed differently, master keyed and furnished with 2 keys per lock. Locks and corresponding keys are alpha-numerically coded for a quick match.

2.07 COUNTER TOPS

A. Phenolic Resin. 1" thick. Color as selected by Architect.

2.08 ACCESSORIES

A. Plastic Tote Tray.

B. Tack boards on designated unit doors.

2.09 SERVICE FIXTURES

A. Electrical Components, Devices, and Accessories shall be labeled to comply with NFPA 70, Article 100 and marked for its intended use.

B. Electrical Fixtures are 3-wire grounded, 20 A, 125V AC, with stainless steel cover plates and cadmium-plated steel boxes. Pedestal boxes are black, cast aluminum with conduit nipples and lock nuts. When specified, G.F.C.I., ground fault circuit interrupter fixtures are available. G.F.C.I. fixtures are 20 A, 125V AC, with black nylon faceplate.

1. Receptacles: Comply with NEMA WD 1, NEMA WD 6, FS W-C-596, and UL 498. Duplex type, Configuration 5 20R.

C. Sinks: Drop-in sinks by others, unless otherwise noted. Coordinate sink cut-outs with plumbing contractor for factory preparation.

D. Faucets: By others, unless otherwise noted. Coordinate sink cut-outs with plumbing contractor for factory preparation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

1. Walls and openings are plumb, straight and square.

2. Concrete floors level within 1/8 inch level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 COORDINATION

A. Wood casework contractor shall furnish equipment to the building, setting in place, leveling and scribing to walls and floors. Furnish plumbing and electrical fixtures, including nipples and lock nuts needed to secure each fixture to the equipment.

B. Coordination with mechanical contractor who shall furnish, install and connect drain lines, service piping, vents, re-vents, in-line vacuum breakers, special plumbing fixtures, traps and tailpieces. Work to be completed through, under or along backs of working surfaces as required and complete final connection of services. Assemble, install and make final connections of service fixtures furnished by casework contractor, including service fixtures in fume hoods. Furnish, install and connect fume hood blowers, motors and all related ductwork. Furnish, install and connect service piping within fume hoods, including final connection.

C. Coordination with electrical contractor who shall furnish, install and connect electrical service lines, wire and conduit within the equipment, including reagent racks and fume hoods. Work to be completed through, under or along backs of working surfaces as required and complete final connection of services. Install and make final connections of electrical fixtures provided by casework installer, including electrical fixtures in fume hoods.

3.03 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.04 INSTALLATION

A. Install casework in accordance with manufacturer's instructions.

1. Installation of casework shall be plumb, level, true and straight, with no distortions.
2. Use concealed shims as required.
3. Where wood casework butts against other finished work, scribe and cut for an accurate fit.
4. Lubricate operating hardware as recommended by the manufacturer.

B. Install countertop and edge surfaces in one plane with flush hairline seams. Locate seams where shown on Shop Drawings.

1. Provide required holes and cutouts for service fittings as shown on Shop Drawings.
2. Seal unfinished edges and cutouts in plastic-laminate countertops.
3. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent wood casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
4. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Coordination with Mechanical, Plumbing and Electrical Contractors: Coordinate work of this Section with work of other Sections including but not limited to:

1. Water, piping, electrical devices, and wiring.
2. Installation of fittings according to Shop Drawings and manufacturer's written instructions.
3. Setting bases and flanges of sink and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material.
4. Anchorage of fittings, piping, and conduit to wood casework, unless otherwise indicated.

3.05 PROTECTION

A. Cover installed casework and equipment with 4-mil polyethylene.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

D. A qualified manufacturer representative shall demonstrate operation and maintenance procedures of the installed casework and equipment to the Owners personnel.

E. Remove all debris, dirt, rubbish, and excess material accumulated as a result of the installation of this equipment and leave casework clean and orderly.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220000 – PLUMBING GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. This Section contains General Provisions related specifically to the Plumbing Work.

1. Quality Assurance
2. Protection
3. Coordination and Sequencing
4. General Completion
5. Painting and Finishing
6. Excavation for Plumbing Work
7. Concrete for Plumbing Work

B. Drawings and General Provisions of Contract, including General and Supplementary Conditions, apply to this section.

1.02 GENERAL

A. This Contractor, as well as sub-contractors for his work, must carefully read the “Instructions to Bidders” and study the plans and specifications.

1. It is the intention of these specifications to provide for the furnishing and installing of the plumbing equipment complete as shown and specified. Any work or changes which may be evidently necessary to complete the installation shall be furnished by the Contractor as being included in this Contract.

2. During the course of the work, should any ambiguities or discrepancies be found in the specifications to which the Contractor has failed to call attention to before submission of his bid, then the Engineer shall interpret the intent of the specifications, and the Contractor hereby agrees to abide by the Engineer’s interpretation and agrees to carry out the work in accordance with the decision of the Engineer. It is expressly stipulated that neither the instructions nor the specifications shall take precedence, one over the other, and it is further stipulated that the Engineer may interpret or construe the specifications of the work, and of that question the Engineer shall be the sole judge.

3. Where no specified kind of quality of material is given, a first class standard article as approved by the Engineer shall be furnished. The specifications do not undertake to illustrate or set forth every item necessary for the work.

4. Small details not usually shown or specified but necessary for its proper installation and finishing shall be included in the Contractor’s estimate, the same as if hereby specified or shown.

1.03 QUALITY ASSURANCE

A. Laws, Permits, Inspections.

1. Comply with the latest revisions of New York State Uniform Fire Protection and Construction Code, International Plumbing Code, any Local Codes or Regulations that apply.

2. Underwriters Laboratories label required for all electrical materials carrying 50 volts or more.

3. Comply with New York State Energy Conservation Construction Code, as referenced in NYCRR.

4. Comply with N.Y. State Education Department Manual of Planning Standards.

5. Comply to requirements of drawings and specifications that are in excess of governing codes.

6. Comply with section 1621 of the New York State Building Code for seismic requirements.

7. Do not install work as specified or shown if in conflict with governing code. Notify Engineer and request direction.

8. Pay all Inspection and Permit fees.

9. Provide Certificate of Inspection from all governing authorities.

B. Reference to technical society, organization, body or section made in accordance with the following abbreviations:

1. AGA – American Gas Association
2. AIA – American Institute of Architects
3. AMCA – American Moving and Conditioning Association, Inc.
4. ANSI – American National Standards Institute.
5. ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers
6. ASME – American Society of Mechanical Engineers
7. ASTM – American Society of Testing Materials
8. AWSC – American Welding Society Code
9. AWWA – American Water Works Association
10. CS – Commercial Standard
11. FS – Federal Specification
12. IEEE – Institute of Electric and Electronics Engineers
13. NEC – National Electric Code
14. NEMA – National Electrical Manufacturer's Association
15. NFPA – National Fire Protection Association
16. NYBFU – New York Board of Fire Underwriters
17. NYCRR – Codes, Rule and Regulations of the State of New York.
18. NSF – National Sanitation Foundation
19. PDI – Plumbing and Drainage Institute.
20. SMACNA – Sheet Metal and Air Conditioning Contractors National Association
21. USASI – United States of America Standards
22. UL – Underwriters' Laboratories, Inc.

C. Contractor submission of equivalent or substitute items other than those specified is at Contractor convenience only. If a substitution or equivalent is accepted, the Contractor shall coordinate the installation of the substitute or equivalent and make all associated changes required. The Contractor also waives any claim for additional costs associated with the substitute / equivalent which becomes apparent before, during or after installation. The Contractor agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution / equivalent.

1.04 PROTECTION

A. Protect equipment from damage, including water, chemical, mechanical injury and theft.

B. Replace damaged equipment or components.

C. Close and waterproof between sleeves, openings, pipes and voids in walls, floors and foundations to prevent entrance of water or moisture.

D. Holes made in firewalls, partitions, fire stops, shall be patched to maintain fire rating integrity.

E. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.

F. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

G. Protect flanges, fittings, and piping specialties from moisture and dirt.

H. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.05 COORDINATION AND SEQUENCING

A. Coordinate plumbing equipment installation with other building components.

B. Arrange for chases, slots and openings in building structure during progress of construction, to allow for plumbing installations.

C. Coordinate the installation of required supporting devices set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

E. Coordinate connection of plumbing systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Section 15052A“Access to Plumbing Work.”

G. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

H. Coordination with other trades: Right-of-Way as follows:

1. Light Fixtures.
2. Fire Suppression.
3. Steam and condensate piping.
4. Hot water supply and hot water return piping.
5. Drain Pipes and Vents
6. Ductwork
7. HVAC Piping
8. Domestic Water Piping
9. Electrical Conduit

1.06 GENERAL COMPLETION

A. Oiling Equipment.

1. Lubricate equipment and motors in accordance with manufacturer's requirements. Provide lubrication chart in frame mount where directed by Owner.

B. Instructions to Owner's Representative.

1. Give notice to Engineer when all systems are installed and operating.

2. Obtain name of Owner's Representative to receive instructions.

3. Schedule instructions of Owner's Representative by manufacturer's representative and instruct Owner in system installation and operation for all equipment installed under this contract.

C. Provide Operation and Maintenance manuals in accordance with the Requirements of Division 01 "Contract Closeout" Section.

1.07 PAINTING AND FINISHING

A. Refer to Division 09, Section "Painting" for field painting Requirements.

B. Damage and Touch-up: Repair marred and damaged factory painted finishes with materials and procedures to match original factory finish.

1.08 CUTTING AND PATCHING – SEE SPECIFICATION SECTION 220020

1.09 EXCAVATION FOR PLUMBING WORK

A. Description of Work: Types of excavation for plumbing related work specified in this section include:

1. Underground plumbing utilities and services.
2. Underground tanks and equipment enclosures.
3. Interior and Exterior water distribution systems to 5 feet outside of the building or where indicated on the plans.
4. Interior and Exterior sanitary and storm drainage systems to 5 feet outside of the building or where indicated on the plans.

B. Project Conditions.

1. Locate and protect existing utilities and other underground work in manner which will ensure that no damage or service interruption will result from excavating and backfilling. Liabilities arising out of performance of work is responsibility of Contractor doing excavation.

2. Protect persons from injury at excavations by barricades, warnings, and illumination.

3. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install plumbing work on frozen excavation bases or sub bases.

1.10 CONCRETE FOR PLUMBING WORK

A. Types of concrete for plumbing related work specified in this section include:

1. Lean concrete backfill to support plumbing work.

2. Encasement of mechanical work.
3. Plumbing equipment foundations and housekeeping pads.
4. Inertia bases for isolation of plumbing work.
5. Rough grouting in and around plumbing work.
6. Patching concrete cuts to accommodate plumbing work.
7. Thrust block.

1.11 REBATES

A. The Plumbing Contractor shall assist the Owner in applying for any available rebates from manufacturer's, utility companies, etc. on equipment or materials installed under the contract. Provide all required documentation and assist in the completion of applications as required to complete the rebate process. All proceeds from rebates remain the property of the Owner.

PART 2 – PRODUCTS

2.01 BACKFILL MATERIALS

A. Sub base Material (Bedding): Graded mixture of gravel, sand crushed stone or crushed slag.

B. Backfill Material: Soil material free of large stones, shale, wood and similar material.

2.02 CONCRETE

A. Concrete installed by this division shall comply with Division 3 Specifications for Concrete.

PART 3 – EXECUTION

3.01 EXCAVATION - GENERAL

A. Do not excavate for plumbing work until work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum.

B. Excavate with vertical sided excavations to greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross bracing to sustain sides of excavation. Remove sheeting and cross bracing during backfilling wherever such removal would not endanger work or other property. Where not removed, cut sheeting off at sufficient distance below finished grade to not interfere with other work.

C. Width: Excavate for piping with 6" to 9" clearance on both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Excavate for other mechanical work to provide minimum practical but adequate working clearance.

D. Depth for direct support: For work to be supported directly on undisturbed soil, do not excavate beyond indicated depths, and hand excavate bottom cut to accurate elevations, undercut at pipe hubs.

E. Depth for sub base support: For large piping (6" pipe size and larger), tanks, and where indicated for other plumbing work, excavate for installation of sub base material in depth indicated or, if not otherwise indicated, 6" below bottom of work to be supported.

F. Depth for unsatisfactory soil or rock conditions: Where directed, (because of unsatisfactory conditions at bottom of indicated excavation), excavate additional depth as directed to reach

satisfactory conditions. Backfill with sub base material compacted as directed, to indicate excavation depth.

G. Store excavated material (temporarily) near excavation, in manner, which will not interfere with or damage excavation or other work. Do not store under trees (within drip line).

1. Dispose of excavated material, which is either in excess of quantity needed for backfilling, or does not comply with requirements for backfill material.

2. Remove unused material from project site, and dispose of it in lawful manner.

3.02 WATER CONTROL

A. Maintain dry excavations for plumbing work, by removing water. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations, protect excavations from major inflow of ground water, by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below grade property from being damage by water, sediment or erosion from or through plumbing work excavations.

3.03 BACKFILLING

A. Do not backfill until installed plumbing work has been tested and accepted.

B. Install drainage fill where indicated, and tamp to uniform firm density.

C. Backfill with finely graded sub base material to 6” above wrapped, coated and plastic piping and tanks, or as shown on drawngsand to centerline of other tanks.

D. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

E. Backfill simultaneously on opposite side of plumbing work, and compact simultaneously, do not dislocate work from installed positions.

F. Backfill excavations in 8” high courses of backfill material uniformly compacted to the following densities (% of maximum density, ASTM D1557), using power-driven hand operated compaction equipment.

1. Lawn and landscaped areas: 85% for cohesive soils, 90% for cohesion less soil.

2. Paved areas and roadways: 90% for cohesive soils, 95% for cohesion less soils.

G. Backfill to elevations matching adjacent grades, at time of backfilling excavations for mechanical work. Return surfaces to original condition.

H. After covering piping with 6” layer of approved fill backfill and compact excavations beneath:

1. New foundations.
2. Slabs on grade.
3. Areas to be paved by General Contractor.

3.04 CONCRETE BASES

A. Construct concrete equipment bases of minimum 4 inches higher or as shown on drawings, and not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer’s setting templates for anchor bolt and tie locations.

3.05 CONCRETE GENERAL

A. Concrete installed by this division shall comply with Division 03 Specifications for Concrete.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220010 – CODES, STANDARDS, AND PERMITS

PART 1 – GENERAL

1.01 GENERAL

A. The entire installation shall be made in accordance with State rules and regulations and shall also conform with the standards of the National Board of Fire Underwriters for this installation and the local Board of Fire Underwriters having jurisdiction. The installation shall also comply with air pollution requirements of the State of New York and Industrial Code Rule 4 of the State of New York Department of Labor, Board of Standards and Appeals, dated March 31, 1965, and all other ordinances having jurisdiction.

B. The Contractor shall submit to all authorities having jurisdiction all required applications and shall secure all necessary permits, tests, and inspections required for final approval.

C. Certain standard and staple materials are described by reference to standard specifications. These standards are as follows:

AGA	American Gas Association
ASA-B9	Safety Code for Mechanical Refrigeration
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
CGA	Compressed Gas Association
AWWA	American Water Works Association
CS	Commercial Standard
FS	Federal Specification
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
PDI	Plumbing and Drainage Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
USASI	United States of America Standards Institute
UL	Underwriters' Laboratories
	New York State Uniformed Fire Prevention and Building Code
IPC	International Plumbing Code

D. All electric facilities shall receive the Underwriters label and be installed in accordance with the latest issue of the National Electric Code requirements.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220020 – CUTTING AND PATCHING

PART 1 – GENERAL

1.01 GENERAL

A. Each Contractor shall be responsible for his cutting and patching. The Contractor shall also be responsible for all finish patching and painting.

B. Each Contractor shall replace and patch any surfaces of any structure disturbed by his operations and his work, even if such operations and work are outside the contract limit. Such replacement, repair, and patching shall be with similar material and shall restore surfaces as they exist, or better.

C. Cut and alter existing materials as required to perform the work. Limit cutting to the smallest amount necessary for proper installation of the work.

D. Where the removal of existing building components necessitates the addition of patching in new materials, such work shall be executed to insure the fire resistance rating of the system and visual continuity with adjacent surfaces, whether or not the remedial work is specifically detailed on the drawings.

E. Perform the removal work with such care as may be required to prevent damage to adjoining construction which is to remain.

F. Do not disturb any existing structure, piping, apparatus, or other construction which must remain unless expressly required by the contract. Where cutting or removals are required in existing construction, do the work in a manner that will safeguard and not endanger the structure and as approved by the Engineer.

G. If unforeseen obstructions are encountered, take all precautions necessary to prevent damage and obtain full instructions from the Engineer before proceeding with the work.

H. Remove from the site all debris and other materials resulting from the alterations and removals, subject to the General Requirements.

I. Fill all voids and patch existing construction and finishes damaged within area of alteration work unless otherwise indicated. Provide new materials to match existing corresponding items as closely as practicable.

J. Any pipe penetrations through fire rated areas shall be accomplished using Hilti fire barrier products in sheets, strips, or caulk using ASTM, UL, and FM standards.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220030 – SCHEDULE OF EQUIVALENCY

PART 1 – GENERAL

1.01 GENERAL

A. Wherever a brand name or manufacturer is named in this specification, it indicates the standard of quality or purpose desired. Where one certain kind, type, brand, or manufacturer of materials is named, it shall be regarded as the standard quality. Where two or more are named, these are presumed to be equal, and the Contractor may select one of those items; if the Contractor desires to use any other kind, type, brand, or manufacturer of material other than named in the specifications, he shall submit a list, with his bid, stating what material, equipment, or method is offered as equal and how it affects the contract price.

B. The equivalency of such items is to be judged by the Engineer whenever offered by bidders as equivalent to the Base Bid items and so reported to the Owner for his ultimate decision.

C. The following manufacturers are approved equivalents for those listed in the specifications:

1. Insulation:

   Johns-Mansville Corporation
   Owens-Corning Fiberglass Corporation
   Knauf
   Certainteed

2. Drains, Cleanouts, Flashing Sleeves, Wall Hydrants, Water Hammer Arrestors, Interceptors, and Fixture Supports

   Zurn Manufacturing Company
   Josam Manufacturing Company
   Jay R. Smith Company

3. Plumbing Fixtures

   Zurn
   American Standard
   Crane Company

4. Fixture Trim

   American Standard
   Chicago Faucet Company
   T & S Brass and Bronze Works

5. Flush Valves

   Zurn
   Sloan Valve Company
   American Standard

6. Toilet Seats

   American Standard
   Olsonite
   C.F. Church Company

7. Access Doors

   Karp Associates, Inc.
   Zurn Manufacturing Company
   Wilcox Steel Company

8. Valves

   Jenkins Brothers
   Lukenheimer Company
   Walworth Company

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220100 – MAINTENANCE INSTRUCTIONS

PART 1 – GENERAL

1.01 GENERAL

A. In addition to the requirements outlined in the "General Provisions", the following information shall be incorporated:

1. Manufacturer's plumbing equipment parts list of all functional components including control diagrams and wiring diagrams of controllers.

2. Step by step instructions for each system including preparation for starting, operation, and shutdown. Provide full maintenance manual describing procedures for each new piece of equipment. In addition, provide a video showing / describing step by step instructions for maintenance of each new piece of equipment.

3. Twelve-month maintenance schedule for each type of equipment.

4. Possible breakdowns and repairs for each type of equipment.

5. List of nearest local suppliers for all equipment.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220300 – PLUMBING BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. This Section includes the following basic plumbing materials and methods to complement other Division 22 Sections.

1. Submittals.
2. Pipe joining materials and installation instructions common to piping systems.
3. Piping specialties: Escutcheons, dielectric fittings, sleeves and seals.
4. Non-shrink grout for equipment installations.
5. Drip pans.
6. Pipe supports: Hangers, clamps, support spacing, building attachments, shields and saddles, flashing, miscellaneous materials, and anchors.
7. Field fabricated metal and wood equipment supports.
8. Firestopping.

B. Pipe and pipe fitting materials are specified in piping system sections.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. NSF 372 and ANSI 61

1.03 SUBMITTALS

A. General - Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for following piping specialties:

1. Mechanical sleeve seals.
2. Identification materials and devices.

C. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

1.04 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. All materials and workmanship shall, at a minimum be in accordance with (in no order of precedence):

1. New York State Codes – latest edition as adopted by the Authority Having Jurisdiction, unless otherwise noted.

2. State and municipal Building Codes and related subcodes.

3. Occupational and Safety Act (OSHA) Requirements.

4. Rules and Regulations of the Authority Having Jurisdiction applicable to the work.

5. National Electrical Standards Association Standard for Good Workmanship in Electrical Construction (NECA-1)

6. Serving utility's rules and regulations for providing service.

7. Contract Drawings and Specifications.

8. Manufacturer recommended installation instructions, practices and procedures for the products being utilized or installed.

9. Where conflicts arise between the above, the more stringent requirement shall be adhered to.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C. All fittings NSF 372 ANSI 61.

2.02 PIPE JOINING MATERIALS

A. Refer to individual piping system specification Sections in Division 22 for special joining materials not listed below.

B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, except where thickness or specific material is indicated.

    a. Full-Face Type: for flat-face, Class 125 cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: for raised-face, Class 250 cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8-inch-thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

2.03 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling and floor plates; deep-pattern type, where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube and insulation of insulated piping.

2. Outside Diameter: Completely cover opening.

3. Cast Brass: One-piece, with set-screw.

a. Finish: Rough brass.
b. Finish: Polished chrome plate.

4. Cast Brass: Split casting, with concealed hinge and set-screw.

a. Finish: Rough brass.
b. Finish: Polished chrome plate.

5. Stamped Steel: One-piece, with set screw and chrome plated finish.

6. Stamped Steel: One-piece with spring clips and chrome plated finish.

7. Stamped Steel: Split plate with concealed hinge, set-screw, and chrome plated finish.

8. Stamped Steel: Split plate with concealed hinge, spring clips and chrome plated finish.

9. Cast-Iron Floor Plate: One-piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.

2. Insulating Material: Suitable for system fluid, pressure and temperature.

3. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F temperature.

4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system pressures.

5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers and steel backing washers.

a. Provide separate companion flanges and steel bolts and nuts for 150 or 300 psig minimum working pressure to suit system pressures.

6. Dielectric Couplings: Galvanized steel coupling, having inert and non-corrosive, thermoplastic lining, with threaded ends and 300 psig minimum working pressure at 225 deg F temperature.

7. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive, thermoplastic lining, with combination of plain, threaded or grooved end types and 300 psig working pressure at 225 deg F temperature.

C. Mechanical Sleeve Seals: Modular, watertight, mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab and roof penetrations.

1. Steel Sheet-Metal: 24 gage or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.

2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.

3. Cast-Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.

4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.

    a. Penetrating Pipe Deflection: 5 percent without leakage.
    b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111 of housing and gasket size as required to fit penetrating pipe.
    c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
    d. Housing-to-Sleeve Gasket: Rubber or neoprene, push-on type, of manufacturer's design.

5. Cast-Iron Sleeve Fittings: Commercially-made, sleeve having integral clamping flange, with clamping ring, bolts and nuts for membrane flashing.

    a. Underdeck Clamp: Clamping ring with set screws.

2.04 VALVES

A. Refer to individual piping system specifications section in Division 22 for special valves not listed below.

B. General

1. Valves shall be installed only in upright vertical or horizontal positions unless specifically otherwise required by the drawings.

2. All valves shall be installed in accessible locations to facilitate easy removal for repair or replacement. Where not possible provide access doors. Refer to 220555.

3. All gate and globe valves shall be designed for repacking when wide open under pressure.

4. Domestic water system valves 3/4" and smaller and all balancing valves shall be globe type.

5. All valves of the same type shall be the products of a single manufacturer and shall comply with ANSI B31.1.

6. All valves for domestic water use shall be no lead type in accordance with NSF-372 ANSI 61.

C. Gate Valves

1. Cold, hot, and hot water return, 2" and smaller: Ball type solder end connections. Jenkins, Nibco, or equal Type B. 3" and larger gate valve: Jenkins, Nibco, or equal Type 1, Class "A", Style 3.

D. Globe Valves

1. 3" or smaller: Jenkins, Nibco, or equal. Over 3": Jenkins, Nibco, or equal, Type 1 with cast iron body and bronze trim.

E. Check Valves

1. 3" and smaller: Jenkins, Nibco, or equal, Type IV, Class "A".

2.05 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory-packaged.

2.06 DRIP PANS

A. Provide drip pans fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inches. Reinforce top, either by structural angles or by folding over according to size. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

2.07 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. General: Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports. Hangers and supports shall be in complete conformance with Chapter 3 of the New York State Plumbing Code. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper plated hangers and supports for copper piping systems.

B. Adjustable steel clevises.

1. Material: Carbon steel, copper plated for copper piping.
2. Finish: Black or copper plated.
3. Adjustment: Hanger to be adjustable for vertical height of pipe without removing the pipe.

2.08 VERTICAL PIPING CLAMPS

A. Two bolt riser clamp.

1. Material: Carbon steel copper plated for copper piping.
2. Finish: Black or copper plated.

2.09 HANGER ROD AND SPACING

ROD SIZE AND SPACING SCHEDULE

Pipe Size	Maximum Spacing		Rod Size
	Steel	Copper	
1/2 to 1	6 ft.	6 ft.	3/8"
1-1/4 to 1-1/2	6 ft.	6 ft.	3/8"
2	12 ft.	10 ft.	3/8"
2-1/2 - 3-1/2	12 ft.	10 ft.	1/2"
4 - 5	12 ft.	10 ft.	5/8"
6	12 ft.	10 ft.	3/4"
8 - 12	12 ft.		7/8"
14 - 16	12 ft.		1"

Note: Cast Iron - support at every hub or coupling 5 ft. maximum spacing.

2.10 BUILDING ATTACHMENTS

A. General: Except as otherwise indicated provide factory fabricated building attachments of one of the following types listed, selected by Installer to suit building substrate conditions. Select size of building attachments to suit hanger rods. Provide copper plated building attachments for copper piping systems.

B. On Structural Steel:

1. For pipes 2" and smaller: C clamps with lock nuts similar to Anvil figure 86.
2. For pipes 5" and larger: Use beam clamps similar to Anvil figure 228 or 292.

C. On New Masonry:

1. Use concrete inserts similar to Anvil figure 281.

D. On Existing Concrete:

1. Use expansion case similar to Anvil figure 117.

E. On Wood:

1. Use coach screw rods Anvil figure 142. Ceiling flanges Anvil figure 153, or fabricated angle clips. Use wood drive screws or lag bolts as fasteners.

2.11 SHIELDS AND SADDLES

A. General: For insulated piping.

B. Shields: 16-gauge galvanized metal.

C. Protection saddles:

1. Hardwood block
2. Steel saddle Anvil 160 series

2.12 FLASHING MATERIALS

A. General: Provide flashings for each penetration of plumbing systems through roofs or waterproof membranes.

B. Molded Pipe Flashing: Compatible with single ply membranes with which it is used and manufactured by membrane manufacturer.

C. Coated copper flashing: Provide cold-rolled sheet copper (ANSI/ASTM B 370), of proper temper for applications shown and required forming, coated on one side with not less than 0.06 lbs. per sq. ft. of antimony (ANSI/ASTM B 101, Type I, Class A), weighing 1.06 lbs. per sq. ft., except as otherwise indicated.

D. Bituminous coating: FS TT-C-494, or MIL-C-18480, or SSPC-Paint 12, cold applied solvent type bituminous mastic coating for application in dry film thickness of 15 mils per coat.

2.13 MISCELLANEOUS MATERIALS

A. Metal framing: Provide products complying with NEMA.

B. Steel plates, shapes and bars: Provide products complying with ANSI/ASTM A 36.

C. Heavy duty steel trapezes: Fabricate from steel shapes selected for loads required, weld steel in accordance with American Welding Society (AWS) standards.

D. Pipe guides: Provide factory fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two section outer cylinder and base with a two section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.14 ANCHORS

A. Fabricate pipe anchors from 3 x 3 x 1/2" angle.

B. Use pipe protection saddles one size larger than piping.

PART 3 – EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 15A specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordinate drawings.

C. Pitch piping at low points. Provide Manual Blowdown for maintenance.

D. Install piping at indicated slope.

E. Install components having pressure rating equal to or greater than system operating pressure.

F. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

G. Install piping free of sags and bends.

H. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

I. Install piping tight to slabs, beams, joists, columns, walls and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

J. Install piping to allow application of insulation plus 1-inch clearance around insulation.

K. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

L. Install fittings for changes in direction and branch connections.

M. Install couplings according to manufacturer's printed instructions.

N. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wallboard partitions and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw and polished chrome-plated finish. Use split-casting escutcheons where required, for existing piping.
2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips and chrome-plated finish.
5. Piping in Utility Areas: Cast-brass or stamped-steel with set-screw or spring clips.

O. Sleeves are not required for core drilled holes.

P. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.

Q. Install sleeves for pipes passing through concrete and masonry walls, concrete floor and roof slabs, and where indicated.

R. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs and where indicated.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.

2. Build sleeves into new walls and slabs as work progresses.

3. Install large enough sleeves to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. CPVC Pipe Sleeves: For pipes smaller than 6 inches.
    b. Steel Pipe Sleeves: For pipes smaller than 6 inches.
    c. Steel Sheet-Metal Sleeves: For pipes 6 inches and larger, penetrating gypsum-board partitions.
    d. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
    e. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.

S. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeve and mechanical sleeve seals. Size sleeve for 1 inch annular clear space between pipe and sleeve for installation of mechanical seals.

1. Install steel pipe for sleeves smaller than 6 inches.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger.
3. Assemble and install mechanical seals according to manufacturer's printed instructions.

T. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.

U. Below Grade, Exterior Wall, Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.

V. Verify final equipment locations for roughing-in.

W. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

X. Piping Joint Construction: Joint pipe and fittings as follows and as specifically required in individual piping system specification Sections.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS "Soldering Manual", "The Soldering of Pipe and Tube".
4. Brazed Joints: Construct joints according to AWS "Brazing Manual", "Pipe and Tube".
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:

    a. Note the internal length of threads in fittings or valve ends and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

Y. Welded Joints: Construct joints according to AWS "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to "Quality Assurance" article.

Z. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

AA. Piping Connections: Except as otherwise indicated, make piping connections as specified below.

1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2 inches or smaller threaded pipe connection.
2. Install flanges, in piping 2 1/2 inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials or dissimilar metals.
4. Wet Piping Systems (Water): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom, where mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

D. Install mechanical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.03 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel".

3.04 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.05 GROUTING

A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms for placement of grout, as required.

D. Avoid air entrapment when placing grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide a smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's printed instructions.

3.06 DRIP PANS

A. Locate drip pans under piping passing over or within 3 feet horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, and weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1-inch drain line to drain connection and run to nearest plumbing drain or elsewhere as indicated. Provide Leak Detection

Alarm Floodmaster RS097. Provide power to unit.

3.07 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments at required locations in concrete, in wood or on structural steel for proper piping support. Space attachments within maximum piping span length indicated. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed, fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.08 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Install hangers and supports of same type and style for grouped piping runs.

C. Support fire water piping independently of other piping.

D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

E. Provisions for movement:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
2. Load distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Pipe slopes: Install hangers and supports to provide indicated pipe slopes.

F. Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.09 SHIELDS AND SADDLES FOR INSULATED PIPING

A. 4" and below use 16 gauge x 12 inch long shield with oversized hanger outside insulation.

B. 6" and above use hardwood protection saddle with 16 gauge x 18 inch long shield with oversized hanger outside insulation.

C. 6" and above use steel protection saddle. Fill void between shield and pipe with insulation. Cover with vapor barrier. Protect barrier with 16 gauge x 18 inch long shield with oversized hanger outside assembly.

3.10 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

D. Anchor spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.11 FLASHINGS

A. Manufacturer's recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being installed.

B. Coat back side of metal flashings where in contact with concrete and other cementitious substrates, by painting surface in area of contact with heavy application of bituminous coating, or by other permanent separation as recommended by manufacturer of metal.

C. On vertical surfaces, lap flashings minimum of 3".

D. On sloping surfaces, for slopes of not less than 6" in 12", lap unsealed flashings minimum of 6".

E. For embedment of metal flashing flanges in roofing or composition flashing or stripping, extend flanges minimum of 6" for embedment.

3.12 FIRE STOPPING

A. Provide UL listed and tested firestopping material, silicone elastomer specifically formulated for use in horizontal and vertical applications. The material shall possess intumescent characteristics, and upon exposure to heat above 250 degrees F. shall expand to not less than five times its original volume to form a fireproof envelope UL rated for 2- and 3-hours protection, when applied in accordance with the manufacturer's recommendation.

B. See section 220680 for additional fire stopping requirements.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220553 – PLUMBING IDENTIFICATION SYSTEMS

PART 1 – GENERAL

1.01 GENERAL

A. Provide labels for all new pipes including hot water, hot water return, cold water, sanitary drain, storm drain, vent, gas and acid waste piping. Install identifying tags on all valves.

PART 2 – PRODUCTS

2.01 EQUIPMENT LABELS

A. Small: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color. Tape shall be 3/8” wide.

B. Large: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color.

C. Make: Seton Name Plate Corporation.

2.02 PIPING MARKERS

A. Pipe markers shall be snap-on type indicating pipe contents and direction of flow on a color coded background conforming to American National Standards Institute (ANSI) Standard A13.1. Pipe diameter less than 2” and smaller shall be snap-on type. Pipe diameter greater than 2” shall be stick-on type.

1. Hot water – green with white lettering.
2. Cold water – green with white lettering.
3. Sanitary Drain and Vent – green with white lettering.
4. Storm Drain – green with white lettering.
5. Gas – yellow with black lettering.
6. Acid Waste – black with orange lettering.

B. Make: Seton Name Plate Corporation – Setmark, or equal by Dover, Brady.

2.03 VALVE TAGS

A. Tags: Tags shall be 1 3/4” x 3 1/2” laminated with two 0.020” thick plastic sheets with matte finish and with a brass eyelet in the corner. Typed information shall include appropriate alphanumeric code (prefixed with the letter “P”), system designation, the fluid in the pipe, and size and function of the valve.

B. Make: Dover Enterprises, Syracuse, New York or approved equal by Seton Name Plate Company.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish; including valve tags in finished mechanical spaces, install identification

after completion of covering and painting.

3.02 EQUIPMENT

A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Meters, gauges, thermometers and similar units.
2. Fuel-burning units including water heaters.
3. Pumps and similar motor-driven units.
4. Storage tanks and pressure vessels.
5. Strainers, filters, humidifiers, water treatment systems and similar equipment.

B. Lettering Size: Minimum 1/4" high lettering for name of unit where viewing distance is less than 2'–0", 1/2" high for distances up to 6'-0", and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 size of principal lettering.

C. Text of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

3.03 PIPING

A. After piping has been painted or insulated, apply pipe labels as specified above.

B. Space labels on 15' centers in mechanical rooms, space at 25' centers elsewhere and at each side of partitions and interior walls. Also, at each branch and riser take off and adjacent to each valve (except at fixtures and equipment).

3.04 VALVES IDENTIFICATION

A. General: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience hose bibs, and shut-off valves at plumbing fixtures, and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.

B. Provide valve tag chart, framed and securely fastened to the wall, using anchors and fasteners, where directed by owner.

C. Submit list of valve tags, including wording, for approval **BEFORE** ordering.

3.05 ADDITIONAL INFORMATION

A. For additional information see Specification Section 220300 – Plumbing Basic Materials & Methods.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220555 – ACCESS TO PLUMBING WORK

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Access doors in walls and ceilings.

1.02 SUBMITTALS

A. Product data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.

1.03 QUALITY ASSURANCE

A. Fire resistance ratings: Where fire resistance rating is required for construction penetrated by access units, provide UL listed and labeled units, except for units which are smaller than minimum requirements.

PART 2 - PRODUCTS

2.01 ACCESS DOORS

A. Where walls and ceilings must be penetrated for access to mechanical work, provide types of access doors indicated. Furnish sizes indicated or, where not otherwise indicated, furnish adequate size for intended and necessary access. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.

B. Construction: Except as otherwise indicated, fabricate wall/ceiling door units of welded steel construction with welds ground smooth, 16-gauge frames and 14-gauge flush panel doors, 175 degree swing with concealed spring hinges, flush screwdriver-operated cam locks, factory applied rust-inhibitive prime coat paint finish.

C. Available manufacturers:

1. Milcor Div., Inryco Inc.
2. Smith (Jay R.) Mfg. Co.
3. Zurn Industries, Inc.

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with manufacturer's instructions for installation of access doors.

B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

C. Adjust hardware and panels after installation for proper operation.

D. Remove or replace panels or frames which are warped, bowed, or otherwise damaged.

E. Paint access doors to match surrounding surfaces.

F. In wet and damp locations provide stainless steel doors.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220680 – FIRE STOPPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested fire stop systems shall be used in specific locations as follows:

1. Penetrations for the passage of cable, conduit, piping, through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. Openings and penetrations in fire-rated partitions or walls.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 220300 – Plumbing Basic Materials and Methods
2. Section 220719 – Plumbing Insulation

1.05 REFERENCES

A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Fire stop Devices (XHJI)
b. Fire Resistance Ratings (BXUV)
c. Through-Penetration Fire stop Systems (XHEZ)
d. Fill, Voids, or Cavity Material (XHHW)
e. Forming Materials (XHKU)

2. Alternate “Omega Point Laboratories Directory” (updated annually)

C. Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems” (July 1998.)

D. Test Requirements: ASTM E 1966-01, “Standard test method for Fire Resistive Joint Systems”

E. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.

H. All major building codes: ICBO, SBCCI, BOCA, and IBC.

I. NFPA 101 - Life Safety Code

J. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2A of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma (or equal) 800-879-8000

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
   a. Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.

2. Hilti CP 681 Tub Box Kit for use with tub installations.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Firestop Sealant
5. Hilti CP 601s Elastomeric Firestop Sealant

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
2. Hilti CP 606 Flexible Firestop Sealant
3. Hilti FS-ONE Intumescent Firestop Sealant

E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti CP 672 Speed Spray
2. Hilti CP 601s Elastomeric Firestop Sealant
3. Hilti CP 606 Flexible Firestop Sealant
4. Hilti CP 604 Self-leveling Firestop Sealant

F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.

1. Hilti CP 677 Speed Plugs
2. Hilti CP 767 Speed Strips

G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Fire stop Sealant
2. Hilti CP 618 Fire stop Putty Stick
3. Hilti CP 620 Fire Foam
4. Hilti CP 601s Elastomeric Fire stop Sealant
5. Hilti CP 606 Flexible Fire stop Sealant

I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Fire stop Putty Stick

J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Fire stop Putty Pad

K. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 642 Fire stop Collar
2. Hilti CP 643 Fire stop Collar
3. Hilti CP 645 Wrap Strips

L. Materials used for complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti CP 637 Trowelable Fire stop Compound
2. Hilti FS 657 FIRE BLOCK
3. Hilti CP 620 Fire Foam

M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK

N. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

O. Provide a fire stop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.

3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate location and proper selection of cast-in-place fire- stop devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities, and engineer.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220719 – PLUMBING INSULATION

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of plumbing insulation work required by this section is indicated on Drawings and by requirements of this section.

B. Work includes thermal insulation for the following:

1. Domestic cold water piping.

2. Domestic hot water and hot water circulating piping.

3. Domestic tempered water piping.

4. Storm water drainage piping.

5. Roof drain bodies.

1.02 QUALITY ASSURANCE

A. Fire Hazard Classification: In accordance with ASTM E-84, NFPA 255 and UL 723, for insulation systems, including insulation, adhesives and coverings, not to exceed the following:

1. Flame spread 25.

2. Fuel contributed 50.

3. Smoke developed 50.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers specification sheets, installation instructions, fire and smoke ratings. Submit schedule matching insulation type to mechanical systems and equipment.

1.04 INSULATION THICKNESS

A. Insulate domestic hot water supply, tempered water, and hot water recirculating piping with insulation thickness of fiberglass piping insulation as shown below, ASTM C 547 Class 1, with All Service Jacket.

B. Insulate domestic cold water Branches and Mains with insulation thickness as shown below of fiberglass piping insulation, ASTM C 547 Class 1.

C. Insulate storm water piping and roof drains with 1” insulation thickness of fiberglass insulation, ASTM C 547 Class 1.

D. Insulate condensate drain to HVAC units with 1” fiberglass insulation.

To Meet or Exceed Energy Conservation Construction Code of the State of New York

THICKNESS TABLE

	IPS 1-1/4" & Below	IPS 1-1/2" to 4"	IPS Above 4"
Hot Water	1"	1-1/2"	1-1/2"
Hot Water Ret.	1"	1-1/2"	N/A
Cold Water	1"	1"	1"
Storm	1"	1"	1"

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet installation, remove from project site.

PART 2 - PRODUCTS

2.01 DOMESTIC COLD WATER, HOT WATER, TEMPERED, AND HOT WATER CIRCULATING PIPING

A. Scope: Insulate all mains, branches, fittings, flanges and valves including those in ceiling spaces, pipe chases or spaces. Terminate insulation at the fixture supply stops. Insulate equipment connections to the equipment stop.

B. Type:

1. Pre-formed sectional type nominal 3# density glass fiber in standard 3' long sections tightly butted together. K factor (Thermal conductivity) of 0.23 at 750 mean. Make: Mansville, Owens-Corning, or Knauf.

C. Finish:

1. Main mechanical room piping and exposed risers and runouts in finished rooms: Factory-applied All Service Jacket with self-sealing laps.

2. Valves, fittings and flanges: Equal thickness of fiberglass insulation with Zeston fittings covers or equal by Ham-Fab, Mansville.

2.02 STORM WATER PIPING – ABOVE GROUND

A. Scope: Insulate all horizontal piping above ground including underside of roof drain bodies and all fittings.

B. Type: Pipe insulation shall be preformed sectional type nominal 3 pound density glass fiber in standard 3 foot long sections with a K factor of 0.23 at 75 mean and factory applied All Service Jackets. Seal joints with 3" All Service Jacket.

C. Fittings & Drain Bodies: Insulate all fittings, hubs, flange and Drain bodies with fiberglass pre-moulded fitting insulation or with 1" resilient fiberglass blanket. (3/4) pcf density minimum) wrapped around the fitting or drain body, tied down with wire or jute. Compress blanket 50% in installation.

Coat each fitting or drain body with two 1/8” coats of vapor barrier mastic reinforced with glass fabric extending 2” onto adjacent pipes.

2.03 METAL JACKETED PIPE INSULATION

A. Scope: Pipe exposed to weather or physical abuse shall be insulated with .016” aluminum jacket over fiberglass insulation of the specified thickness. Sections shall be made in 36” lengths.

B. Fire and smoke Hazard Classification shall not exceed flame spread index of 25 or less and smoke developed index of 50 or less as tested by ASTM E-84, NFPA 255 or UL 723.

C. Manville Micro-Lok 650ML.

2.04 EQUIPMENT INSULATION MATERIALS

A. Rigid Fiberglass Equipment Insulation: ASTM C 612, Class 2.

B. Flexible Fiberglass Equipment Insulation: ASTM C 553, Type I, Class B-4.

C. Jacketing Material for Equipment Insulation: Provide pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard, or metal jacket at Installer’s option, except as otherwise indicated.

D. Equipment Insulation Compounds: Provide adhesives, cements, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

E. Equipment Insulation Accessories: Provide staples, bands, wire, wire netting, tape, corner angles, anchors and stud pins as recommended by insulation manufacturer for applications indicated.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Apply insulation in accordance with the Schedule of Insulation on the Contract Specifications.

B. Use only insulation and finish materials including adhesives, cements, and mastics which conform to the requirements of all local codes and ordinances.

C. Fire resistant adhesive is highly flammable in liquid form. Eliminate welding, smoking, or other sources of ignition during application.

D. Apply insulation after all piping pressure tests, as described in Piping Installation Procedure, have been completed.

E. Clean surfaces of loose scale, dirt, oil, and other foreign matter and dry prior to insulating.

1. Detail for space @ blowdown
2. Detail for pipe @ insulation penetrating wall.

F. Apply insulation to completely cover piping surface. Do not insulate over weld certification stamps.

G. "Exposed" as used in this section means exposed to view. "Concealed" means concealed to view such as in furred chases or above suspended ceiling. Penthouse and equipment rooms are considered exposed locations.

H. Fill surface imperfections in the insulation such as chipped edges, small joints or cracks, and small voids or holes with appropriate insulation material and smooth with skim coat of hydraulic-setting insulating cement. Vapor barriers shall be continuous and unbroken at hanger installations.

I. Fit inside diameter of insulation sections or segments to outside curvature of pipe or previous insulation layer.

J. Where standard insulation shapes are not available, cut, score, or miter segments of appropriate block to fit contour of pipe. Stagger joints of adjoining segments. Fit insulation carefully and secure with No. 20 gage galvanized annealed steel wire. Finish with a smoothing coat of hydraulic-setting insulating cement.

K. Insulate valves, strainer, fittings, and flanges with identical material, density, thickness, and surface finish as the piping insulation. All edges shall be filled with filler and finished with a smoothing coat of hydraulic-setting insulating cement.

L. Insulate the entire surface of fittings and strainers. Insulate valves up to and including bonnets, unless authorized otherwise by Project Engineer. Do not cover removable valve bonnets.

M. Insulate strainers to permit removal of the basket without disturbing the insulation of the strainer body. Strainer covers shall be molded and taped to upper section of insulation.

N. Bevel the ends of pipe insulation adjacent to flanges to permit bolt removal. Provide a collar of sectional block insulation over the flanges and extend a minimum of 2 inches over the adjacent pipe insulation. Fasten with staples to permit easy removal. Prior to applying collar fill annular spaces with loose insulation.

O. Insulate all piping through sleeves.

P. Where pipelines pass through masonry walls or floors, completely fill the space between outside of pipe or insulation and the inside of the sleeve or framed opening with fibrous mineral wool or fiberglass pipe insulation.

Q. When it is unavoidable and hangers for cold lines must be installed directly on the pipe, insulate and finish the entire hanger and the rod for a length of not less than 12 inches above the pipe.

R. Apply insulation to completely cover metal surfaces.

S. Cut, score, or miter insulation to fit shape and contour of equipment. Where surfaces are flat, cylindrical, or regularly curved, use premolded blocks or segments.

T. Where required, provide permanently fastened angles or plates to support insulation.

U. Apply insulation on cover plates, heads and access openings as separate sections, with insulation cut back for access to boltheads and other fasteners.

V. Do not insulate over nameplates. Cut back insulation and line the insulation edges with 24 gage galvanized steel.

W. Surface Finish.

1. Apply surface finish to present a tight, smooth appearance.
2. Do not apply sealant or cement until all previous applications of cement and adhesives have thoroughly dried.
3. Extend surface finish to protect all insulation surfaces. Prevent raw edges or ends of insulation from being exposed.

3.02 INSTALLATION OF PIPING INSULATION

A. Apply to pipes with side and end joints butted tightly per manufacturer's directions.

B. Where joints in insulation occur, and at hangers, take extra precautions to seal the vapor barrier with adhesive BF 95-44 so that no moisture penetration will occur. Notify Engineer when insulation is complete so he may make inspection before walls are closed in or ceilings applied.

C. Where fiberglass insulation is exposed in an occupied room, apply pre-sized glass cloth vapor barrier jacket in same manner using same type of adhesive (or use ASI/SSL).

D. Repair all breaks in the jacket with 4" wide strip of vapor barrier jackets (FRGC or SSL as required) applied smoothly and securely. When applying adhesive at temperature below 750F, use staples with an additional brush coat of adhesive over the exterior of the staples.

E. Adhere 4" wide strips of jacket material smoothly and securely over all end joints with vapor barrier adhesive as above to insure a continuous vapor barrier.

F. Apply insulation on all cold surfaces where vapor barrier jackets are used with a continuous, unbroken vapor seal. Insulate and vapor seal hangers, supports, anchors, etc., that are securely directed to cold surfaces to prevent condensation.

3.03 EQUIPMENT INSULATION

A. Cold Equipment (Below Ambient Temperature)

1. Application Requirements: Insulate the following cold equipment:

   a. Domestic Hot water expansion tanks

2. Insulate each item of equipment specified above with fiberglass: 2" thick.

B. Hot Equipment (Above Ambient Temperature)

1. Application Requirements: Insulate the following hot equipment.

   a. Hot water storage tanks
   b. Water heaters (not insulated by manufacturer)

2. Insulate each item of equipment specified above with fiberglass: 2" thick.

3.04 SUPPORT OF INSULATED PIPE LINES

A. Scope: Install inserts at each hanger or support for all water lines for sizes 1-1/2" and up, or 16-gauge electro-galvanized carbon steel shields may be used in lieu of inserts. Install supporting devices on insulated lines with hangers with insulation shields.

B. Inserts:

1. Inserts between the pipe and pipe hangers shall consist rigid pipe insulation of equal thickness to the adjoining fiberglass insulation and shall be provided with vapor barrier where required.

2. Insulation inserts shall not be less than the following lengths:

   1-1/2" to 2-1/2" pipe size, use 6" length
   3" to 6" pipe size, use 9" length

C. Supporting Devices: Use cork stoppers, short lengths of wood dowels or wood blocks of the same thickness as insulation. Curve the support device surfaces to match the curve of the metal shield. Metal shields are provided with the hanger.

3.05 ADHESIVES, MASTIC, AND COATINGS

A. Apply adhesives, mastic and coatings specified at the manufacturer's recommended coverage per gallon.

3.06 EXPOSED RISERS AND RUNOUTS

A. Finish exposed risers and runouts in occupied rooms with ALL SERVICE JACKET.

B. Occupied areas mean all areas except ceiling spaces, crawl spaces and closed off pipe spaces or chases.

3.07 EXISTING INSULATION REPAIR

A. Repair damaged sections of existing mechanical insulation damaged during this construction period. Use insulation of the same thickness as existing insulation. Install new jacket lapping and seal over existing.

3.08 PROTECTION AND REPLACEMENT

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

C. Surface Finish: No surface finish required.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 220801 – PLUMBING TESTING, ADJUSTING AND BALANCING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provision of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of testing, adjusting and balancing work is indicated by requirements of this section, and also by drawings and schedules.

B. Component types of testing, adjusting and balancing specified in this section includes the following:

1. Rough sanitary and storm piping.
2. Water supply system.
3. Gas system – Refer to Specification Section 226310.

1.03 QUALITY ASSURANCE

A. Installer - a firm with at least 3 years of successful testing, adjusting and balancing experience on projects with testing and balancing requirements similar to those required for this project.

1.04 REQUIREMENTS

A. No system shall be covered or concealed until tested, approved.

B. Pay for Permit and Inspection Fees required by Authority having jurisdiction.

C. Test in presence of Owner's Representative and Plumbing Inspector.

D. Prove tight for period stated or longer if required.

E. Tests may be made in sections.

1.05 CODES AND REQUIREMENTS

A. Comply with latest editions and applicable portions of International Plumbing Code, Local Plumbing Standards, New York State Building Code, especially Article 9, Plumbing Requirements and Plumbing Code.

B. Comply with applicable portions of Standards for Waste Treatment Works, New York State.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide test equipment and materials necessary for tests.

PART 3 – EXECUTION

3.01 GENERAL

A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable.

B. Test, adjust and balance systems and components as indicated, in accordance with procedures outlined below and in applicable standards. Test which follows shall be considered minimum standards.

3.02 TESTS & INSPECTIONS

A. Rough Sanitary and Storm Piping.

1. Stop openings, fill with water to top of highest vent. Water shall hold constant for two (2) hours.
2. May be tested in sections using water pressure test.
3. Test pressure shall be equal to at least 10 ft. water column at all points.
4. Retest at least upper 10 ft. of next lower section.
5. Compliance with the Department of Health Lead in Water Regulation is located on Drawings.

B. Water Supply System.

1. Fill, subject to 125 psig hydrostatic pressure at lowest level for two (2) hours.
2. Fixtures shall not be connected into system during test.
3. After fixtures are connected, test system for two (2) hours, at 75 PSIG or prevailing water pressure, whichever is higher.
4. Regulate flow of water to each fixture.
5. Adjust balancing valves on hot water system.
6. Faucets, flush valves shall operate satisfactorily without waste of water, without objectionable noise.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 221000 – PLUMBING PIPING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of domestic water piping systems work is indicated on drawings and schedules, and by requirements of this section.

B. Applications for domestic water piping systems include the following:

1. Domestic cold water piping.
2. Domestic hot water piping.
3. Domestic recirculating water piping.
4. Water hammer arresters.
5. Valves.
6. Pumps

C. All domestic water piping systems must comply with the “Lead-Free” Division 22 Specifications. The contractor shall provide the required submittals for all equipment that will be part of the system prior to the equipment installation, and confirm on the jobsite that the equipment adheres to “Lead-Free” regulations.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's data for domestic water piping systems, materials and products.

B. Submittals shall include but not be limited to the following:

1. Valves
2. Water hammer arresters
3. Piping
4. Pumps

1.03 QUALITY ASSURANCE

A. Plumbing Code: Comply with applicable portions of New York State Uniform Fire Protection and Building Code, Article 9, Plumbing Requirements, State sanitary code, Department of Health, Division Sanitary Engineering, Bureau of Public Water Supply, any local codes or regulations, and the International Plumbing Code and the International Energy Conservation Code.

B. All piping valves, hydrants, etc. shall comply with all ASME, ANSI, ASTM, AWWA and NFPA regulations that apply to the work.

C. Meters, backflow preventers, hydrants, etc. shall conform to local utility company regulations, ordinances and laws, and the International Plumbing Code (IPC).

D. Obtain all necessary approvals, certificates and arrange for all inspections required by local authorities having jurisdictions. Pay all fees.

E. Perform water sampling upon completion of all piping systems. Samples to be analyzed by a NYS Dept. of Health approved lab for bacteria as well as all other code required chemical / organic

analyses. The plumbing contractor will bear all costs associated with the testing procedures / reports. Test reports shall be included as part of the project closeout documents.

PART 2 – PRODUCTS
(All to comply with the 2020 IPC)

2.01 DOMESTIC WATER PIPING

A. Underground Water

1. 3" or larger: Class 52 ductile iron pipe per AWWA C151, with C104 cement lining, and asphaltic coating inside and out. Fittings shall be cast or ductile iron per AWWA C110, with push-on joints with four serrated silicon bronze wedges at each joint for electrical continuity. Underground type plastic line marker: Provide standard permanent bright colored, continuous-printed plastic tape, intended for direct burial service, not less than 6"wide X 4 mils thick, with lettering "WATER SERVICE".

2. 2" and smaller: Type 'K' copper soldered or brazed.

B. Domestic hot water, cold water and tempered water.

1. Type "L" copper, ASTM B88.
2. Make: Anaconda, or equal by Muller, Revere.
3. Fittings shall be wrought or cast solder type pressure fittings.
4. Chrome plated sponge cleanable brass, sch. 40 for exposed piping.

2.02 BALL VALVES

A. Description: Bronze body, ball valve with 600 PSI W.O.G. min. rating, teflon seats, stainless ball, blow-out proof stem, viton-o-ring sealed union, removable operating handle and solder ends. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61. ANSI372.

2.03 INTERIOR HOSE BIBBS

A. 'No-Lead', Anti-siphon vacuum breaker wall faucet enclosed in a flush mounting wall box, ¾" male hose outlet, loose key opens box and faucet operator, chrome plated casting.

B. Manufacturer:

1. Josam or equivalent. Where indicated, install on cold water piping.

2.04 EXTERIOR WALL HYDRANTS

A. 'No lead', Automatic draining, freezeless wall hydrant with an anti-siphon vacuum breaker enclosed in a flush mounting wall box. Cast bronze, ¾" male hose outlet, non-freeze, "water" on cover, key handle, proper length galvanized wall sleeve, vacuum breaker, wall clamp, chrome finish.

B. Where indicated, install on cold water piping.

2.05 SWING CHECK VALVES

A. General: Construct pressure-containing parts as follows:

1. Bronze valves, 125 or 150 psi: ANSI/ASTM B 62. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61. ANSI 372.

B. Construct valves with disk seating angle 40° to 45° unless composition disc is specified. Provide stop plug as renewable stop for disc hanger. Construct disc and hanger as separate parts, with disc free to rotate. Support hanger pins on both ends by removable side plugs.

C. Soldered ends 2" and smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.

D. Flanged ends 2 1/2" and larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.

E. Manufacturers:

1. Jenkins Bros., A Corp.
2. Kennedy Valve.
3. Lunkenheimer.
4. Stockham Valves and Fittings, Inc.

2.06 SPECIAL VALVES

A. Balance valve:

1. Bronze/Brass Ball valve with pressure readout ports, calibarated nameplate and memory stop. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61.

2. Manufacturer: Bell & Gossett model CB, Watts

B. Trap Primer Valve:

1. 'No lead', Automatic, large port openings, activates on 10 psig pressure drop at 30-250 psig. Water release is factory set. Chrome plated finish.

2.07 THERMOMETERS AND GAGES

A. Water Pressure Gages: 0-150 psi range, aluminum or brass 4-1/2" case, 1/4" NPT connection. Glass enclosed dial with ¼" ball valve. 1 percent accuracy, ANSI B40.1, Grade A.

B. Glass Thermometers

1. General: Die cast aluminum, baked epoxy enamel finish, glass front, 9" long, adjustable joint, locking device. 1 percent accuracy, shock mounted. Copper plated steel or brass stem. Alcohol based thermometers to be used.

2. Range:
   a. Hot water: 30 to 240°F, 2°F divisions.
   b. Cold water: 30 to 180°F, 2°F divisions.

3. Thermometer wells: No Lead, Brass or stainless steel, 2" extension for insulated piping. Cap nut with chain fastened to thermometer well.

2.08 PLUMBING INSULATION

A. General: Comply with Division 22 Section "220719 – Plumbing Insulation".

2.09 UNIONS

A. Description: "No lead" Cast Brass with Solder Ends. Working pressure: 200 PSI W.O.G.

B. Manufacturer: Nibco, or equal by Mueller, Revere.

2.10 SOLDER AND FLUX

A. Solder shall be in solid wire form of Type II 95-5 tin antimony solder conforming to ASTM B-32, Grade 5A. Flux shall conform to ASTM B813. Solders containing lead shall not be used. 96.5 – 3.5 and 95-5 tin/silver solders may be used.

2.11 SHOCK ARRESTER

A. Construction:

1. Type 1: Stainless steel body with stainless steel bellows, an air or argon gas cushion and with or without hydraulic displacement fluid.

2. Type 2: “No lead” Hard drawn copper body, polypropylene piston with EPDM O ring seal and brass NPT threaded connection.

3. Contractor may use either Type 1 or Type 2.

B. Code Compliance: Shock absorbers shall comply with the following codes:

1. P.D.I. – WH201 latest issue.
2. ASSE 1010 latest issue.

C. Manufacturer:
1. Type 1: J.R.Smith 5000 Series.
2. Type 2: Watts LF15M2 -DR Series

PART 3 – EXECUTION

3.01 INSTALLATION OF DOMESTIC WATER PIPING MATERIALS AND PRODUCTS

A. General: Install the following in accordance with Division 22 Section 220300 – “Basic Materials and Methods".

1. Identification.
2. Piping specialties.
3. Supports, anchors and seals.

3.02 INSTALLATION OF PIPE, TUBE AND FITTINGS

A. General: Install in accordance with Division 22 Section 220300 – “Basic Materials and Methods".

B. Install in accordance with recognized industry practices, which will achieve permanently leak proof piping systems. Install each run with minimum joints and couplings. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for pressure piping.

C. Hose faucets at low points. Cap with hose caps.

D. Carry headers for groups of fixtures full size through their length.

E. Swing joints as follows:

1. From water mains to risers.
2. From riser to branch connections to fixtures.
3. From riser to mains.

3.03 INSTALLATION OF SHOCK ARRESTORS

A. General: Upright position, locations and sizes indicated in accordance with PDI Standard WH-201.

3.04 INSTALLATION OF STRAINERS

A. General: Install full size of pipeline, in accordance with manufacturers installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

B. Locate plate-type strainer in supply line ahead of the water meter.

3.05 INSTALLATION OF VALVES

A. General: Install where required for proper operation of piping and equipment, including all branch lines to isolate sections of piping. Locate to be accessible and separate support can be provided.

B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable.

C. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

D. Drain Valves: Each plumbing equipment item. Located to completely drain equipment for service or repair. Base of each riser, base of each rise or drop in piping system, at all low points, and where indicated or required to completely drain system. Provide hose caps on hose bibbs.

E. Check Valves: Horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

3.06 INSTALLATION OF SPECIAL VALVES

A. Balance Valves: Each hot water recirculating loop, and where indicated.

B. Trap Primer Valves: Install in upright, vertical position in a convenient cold water line where indicated for floor drain primer supply.

3.07 INSTALLATION OF THERMOMETERS AND GAGES

A. General: Install in accordance with manufacturer's instructions.

B. Locations: Where indicated on Drawings.

3.08 INSTALLATION OF PLUMBING INSULATION

A. Install in accordance with Division 22 Section "220719 – Plumbing Insulation ".

3.09 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Hot and cold water runouts of sizes indicated, no smaller than required by the Plumbing Code.

B. Mechanical Equipment Connections:

1. Connect hot and cold water piping system to plumbing equipment as indicated.
2. Comply with equipment manufacturer's installation instructions.
3. Provide shutoff valve and union for each connection.
4. Provide drain valve on drain connection.
5. Exposed piping shall be sch. 40 chrome plated brass, sponge cleanable surface.

3.10 WALL HYDRANT AND HOSE BIBB INSTALLATION

A. Wall hydrant: Install approximately 24” above finished grade or as noted on the plans. Install a stop and drain valve on each wall hydrant branch.

B. Hose Bibbs for toilet and finished rooms: In rooms where shown with lavatories, install approximately 18” above finished floor under lavatory where indicated. Elsewhere, install 36” above the finished floor where shown. Install stop on branch. Hose bibbs to be furnished with loose key handles.

3.11 WATER SYSTEM DISINFECTION

A. Scope: All newly installed lines carrying potable water and parts of existing systems which have been altered, extended or repaired prior to use.

B. Before any use of system is made for domestic purposes, disinfect by one of the following methods as specified in the New York State Uniform Fire Prevention and Building Code. All water samples are to be sent to / tested by a New York State Department of Health approved lab for bacteria analysis. All test results shall be sent to the engineer for review prior to placing the systems in service.

1. The system shall be filled with a water solution containing 50 parts per million of available chlorine and allowed to stand for 24 hours before flushing and returning to service.

2. The system shall be filled with a water solution containing 200 parts per million of available chlorine and allowed to stand one hour before flushing and returning to service.

3. For a potable water storage tank, where it is not practicable to disinfect by the foregoing methods, the entire interior of the tank shall be swabbed with a water solution containing 200 parts per million of available chlorine and allowed to stand for two hours before flushing and returning to service.

C. Contractor shall provide test kit for residual chlorine.

D. After contact period flush system with clear water until system tests no more than 0.2 PPM residual chlorine.

3.12 DOMESTIC WATER SYSTEM TEST

A. Test in accordance with the requirements of Section 220801 – “Plumbing, Testing, Adjusting and Balancing.”

3.13 SPARE PARTS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bib, or faucet installed.

3.14 LEAD TESTING REQUIREMENTS

A. Following the completion of the P.C. work scope, the owner shall have the water conditions tested for lead containments by a third-party testing firm to regulation 67.4 of the Department of Health regulations as part of Section 1417 of the Federal Safe Water Act to determine “Lead-Free” compliance and SED guidelines of less then 15 parts per billion.

B. If the system does not comply with Sub-Part Regulation 67.4 of the DOH Section 1417 of the Federal Safe Water Act, the P.C. shall provide replacements at no additional cost, to then repeat the installation and testing requirements. The P.C. shall absorb the fee for the first lead testing procedure as well as the following confirmation procedures at no additional cost to the owner.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 221316 – SANITARY WASTE AND VENT PIPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of soil, waste and vent piping system work, is indicated on drawings and schedules, and by requirements of this section.

B. Applications for soil, waste and vent piping systems include the following:

1. Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.

2. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to sanitary sewer, 5’-0” from building wall, or where shown on drawing. Coordinate with site contractor.

C. Trenching and backfilling is required in conjunction with underground and building drain piping is specified in applicable Division 22 sections, and is included as work of this section.

1.03 QUALITY ASSURANCE

A. Plumbing code compliance - comply with applicable portions of New York State Uniform Fire Protection and Building Code, especially Article 9, Plumbing Requirements, State Sanitary Code, Department of Health, Division Sanitary Engineering, Bureau of Public Water Supply, any local codes or regulations that apply pertaining to plumbing materials, and the 2020 IPC especially Chapter 7.

B. ANSI compliance - comply with applicable American National Standards pertaining to products and installation of soil and waste piping systems.

C. PDI compliance - comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil and waste piping systems.

1.04 SUBMITTALS

A. Product data - submit manufacturer's data for soil and waste piping systems materials and products on the following:

1. Pipe and Couplings
2. Clean outs
3. Floor drains

B. Acceptable Manufacturers

1. Floor Drains
   a. Jay R. Smith

b. Josam
c. Zurn
d. Watts

2. Couplings for no-hub pipe
   a. Anaco
   b. Tyler

3. Soil Pipe
   a. Eastern Foundry
   b. Tyler Pipe
   c. Charlotte Pipe

PART 2 – PRODUCTS
(All to comply with the 2020 IPC)

2.01 SOIL AND WASTE PIPING MATERIALS AND PRODUCTS

A. General - provide piping materials and factory fabricated piping products of sizes, types, pressure ratings and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections, provide fittings of materials which match pipe materials used in soil and waste piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.02 BASIC IDENTIFICATION

A. General - provide identification complying with Specification Section 220553, in accordance with the following listing:

1. Above ground soil, waste and vent piping - pipe markers.
2. Underground building drain piping - underground type plastic line markers.

2.03 PIPE

A. Below Ground:
   1. Service weight cast iron with push-on gaskets, hub and spigot. Compression Gaskets shall conform to the requirements of ASTM Standard C564-14 and CISPI310.

B. Above Ground:
   1. Service weight C.I. soil pipe and fittings with no-hub joints. Make: Tyler pipe or equal by Eastern Foundry Co. Anaheim Foundry Co.
   2. Copper drainage tubing, type DWV, shall not be used on site.
   3. Exposed: Sch. 40 chrome plated brass, threaded, sponge cleanable.

2.04 COUPLINGS FOR NO-HUB PIPE

A. Description: Type 304 stainless steel shield and 3/8” slot head 304 stainless steel screws. All other component metal parts shall be 304 stainless steel. The coupling sealing gasket shall be made of Neoprene as the sole elastomer. A cast iron coupling may be used. Do not use under ground. Coupling shall meet or exceed CISPE Standard 310.

B. Manufacturer: Anaheim Co., Tyler Pipe.

2.05 BASIC PIPING SPECIALTIES

A. General - provide piping specialties complying with Division 22 – Section 220300 Basic Materials and Methods section, in accordance with the following listing:

1. Pipe escutcheons.
2. Mechanical sleeve seals.
3. Pipe sleeves.

2.06 BASIC SUPPORTS AND ANCHORS

A. General - provide supports, anchors and seals complying with Division 22 – Section 220300 Basic Materials and Methods section "Supports and Anchors".

2.07 CLEANOUTS

A. General

1. Units shall meet all design parameters shown on the drawings.
2. Units shall be complete with all design features and accessories necessary to provide a coordinated installation (such as carpet markers, tile recesses, etc.).
3. Units shall be of the following sizes:

    a. Line size for piping to 4”.
    b. 4” for piping from 5” to 8”.
    c. 6” for piping 10” and larger.

4. Location:

    a. At each bend of more than 45 degrees.
    b. At bottom of soil or waste stacks and rainwater leaders.
    c. At 50’ intervals or less on horizontal pipe lines 4” or smaller.
    d. At 50’intervals or less horizontal pipe lines 5” or larger.
    e. At exit of sanitary and storm drains from building.
    f. Wherever shown on the drawings.
    g. At the end of each branch line serving more than two fixtures.

5. Placement: must be located where they will be accessible. Check general construction drawings for location of lockers or other equipment which may prevent access.

B. Cleanout Types

1. Deck Plate Cleanout:

    a. Adjustable cast iron floor cleanout with inside caulk outlet, adjustable ABS housing, clamp device, internal tapered bronze cleanout plug, secured round scoriated nickel alloy cover plate. Jay R. Smith Figure 4020.

2. Wall Plate Cleanout:

    a. Exposed installation: Cast iron ‘T’ branch cleanout tee with bronze tapered plug. Jay R. Smith Fig. 4510
    b. Concealed installation behind plaster, dry or masonry walls: Provide cleanout tee with bronze plug tapped for center screw similar to exposed installation with polished vandalproof stainless steel access plate.

C. Cleanout:

1. Cast iron cleanout with straight body for caulking into soil pipe hub and fitted with bronze plug countersunk or raised head as required.

D. Exterior Cleanout:

1. Round coated cast iron access frame, heavy duty scoriated (vandalproof), secured cover. Coated cast iron cleanout ferrule with inside caulk connection and recessed tapered thread bronze plug.

2.08 FLOOR DRAINS

A. Drains and traps shall be same size as waste pipes. Provide clamping devices for drain flashing. Provide P-trap in outlet from each drain, or as shown on drawings.

B. Drain bodies to be cast iron.

C. Floor drains shall be by Jay R. Smith, Zurn, Watts or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION

A. General - install plumbing identification in accordance with Specification Section 220553.

3.02 INSTALLATION OF SOIL WASTE AND VENT PIPING

A. General - install soil and waste piping in accordance with Division 22 – Section 220300 Basic Materials and Methods section "Pipe, Tube and Fittings" and with Plumbing Code having jurisdiction.

B. Solder joints use Type 1 solder.

C. Insulate vent piping within three feet of passage through roof.

3.03 INSTALLATION DRAINAGE PIPING - SANITARY

A. Changes in direction long sweep bends or 1/8 and/or 1/16 bends.

B. Connections of branches to mains with "Y" fittings and 1/8 and/or 1/16 bends.

C. All connections of horizontal into vertical piping with long turn sanitary "T-Y's".

D. Grade the "horizontal" piping 1/4" per foot, minimum for 2 1/2” or less, 1/8” per foot minimum for 3” and larger.

3.04 TURNS AND OFFSETS

A. Turns:

1. From vertical to horizontal:
   a. Less than 3”: Use long sweep or extra-long turn elbow.
   b. 3” and larger: Use short sweep or 90° short turn fittings.
   c. Horizontal piping: Use 45° wyes, long sweeps: 1/4, 1/6, 1/8 and 1/16 bends or any

combination of same.
d. For vents in any direction; Use quarter bends or 90° short turn fittings.

B. Offsets:

1. Make offsets at no less than 45° angle to the horizontal in the following cases:

a. Offsets in stack vent portion of soil and waste stacks (above the highest fixture drainage connection).
b. Offset in vent stacks.
c. Grade the “horizontal” piping 1/4" per foot.
d. Connect all plumbing fixtures into sanitary house drain. No case shall soil or waste pass through more than one trap before entering house drain.

3.05 INSTALLATION OF VENT PIPING

A. Provide vents shown and required by Plumbing Code.

B. Grade vents to discharge water of condensation.

C. Make offsets at 45 degree angle.

D. Connect upper ends of drainage lines to vent system or extend through roof without decreasing size.

E. Arrange vents and connections except wet vents, so not to carry drainage.

F. Connect bottom to drains so drainage will wash out rust and scale.

G. Extend vents above floor line to not less than 6" above flood rim of highest fixture before running horizontally.

H. Terminate vents 18 inches above roof line.

I. Increase pipes smaller than 3" to 3" from 18 inches below roof to terminus, using standard length tapered increasers.

3.06 INSTALLATION OF PIPING SPECIALTIES

A. Install piping specialties in accordance with Division 22 – Section 220300 Basic Materials and Methods section.

3.07 INSTALLATION OF SUPPORTS AND ANCHORS

A. Install supports, anchors and seals in accordance with Division 22 – Section 220300 Basic Materials and Methods section.

3.08 INSTALLATION OF DRAINAGE PIPING PRODUCTS

A. Cleanouts - install in sanitary above ground piping and sanitary building drain piping as indicated, as required by Plumbing Code, and at each change in direction of piping greater than 45 degrees, at minimum intervals of 50' for piping 4" and smaller and 50' for larger piping, and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping.

B. Flashing flanges - install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

3.09 INSTALLATION OF FLOOR DRAINS

A. General - install floor drains in accordance with manufacturer's written instructions and in locations indicated.

B. Coordinate with soil and waste piping as necessary to interface floor drains with drainage piping systems.

C. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

E. Position drains so that they are accessible and easy to maintain.

3.10 FLASHING

A. General

1. Flash openings with 6 lb. copper flashing.
2. Make watertight, allow for expansion and contraction.

B. Vent pipes

1. Extend not less than 12" from base of pipe.
2. Turn flashing over edge on cast iron; extend into same one (1) inch.
3. Ream coupling screw down over flashing at least one (1) inch screwed pipe.
4. Copper flashing assembly acceptable.

C. Waterproof pipes through waterproof walls or floors: See details on drawings.

3.11 EQUIPMENT CONNECTIONS

A. Piping runouts to fixtures - provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Plumbing Code. Traps and tailpieces shall be chrome plated brass. Waste stubs out of wall (exposed) shall be sch. 40 threaded chrome plated brass. All exposed surfaces shall be sponge cleanable.

3.12 INSPECTION AND TEST

A. New drainage piping shall be subjected to hydrostatic pressure test, see requirements in Section 220801, “Plumbing Testing, Adjusting and Balancing”.

3.13 PROTECTION

A. Protect drains during remainder of construction period, to avoid clogging with construction materials and debris and to prevent damage from traffic and construction work.

END OF SECTION

DIVISION 22 – PLUMBING

SECTION 224000 – PLUMBING FIXTURES AND TRIM

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of plumbing fixtures and trim work is indicated by drawings and by requirements of this section.

B. Types of plumbing fixtures required for the project including but not limited to, the following:

1. Water closets.
2. Urinals.
3. Lavatories.
4. Sinks.
5. Mop sinks.
6. Electric water coolers.
7. Specialty faucets.
8. Showers
9. Floor Drain
10. Hose Bibbs
11. Emergency Eye Wash/Showers
12. Drinking Fountains
13. Bathtubs
14. Shower Bases

C. Refer to Division 26 sections for electrical connections to following plumbing fixtures, not work of this section.

1. Electric water coolers.
2. Electronic flush valves and faucets.

1.02 SUBMITTALS

A. Product Data: Submit Product Data and installation instructions for each fixture, faucet, specialties, accessories, trim etc.

1. Clearly indicate rated capacities of selected models of water coolers.

2. Identify compliance with specified ANSI, UL, ASHRAE and New York State Standards, Codes and Listings and Lead Free Standards. (NSF)

B. Shop Drawings: Submit rough-in drawings. Detail dimensions, rough-in requirements, required clearances and methods of assembly of components and anchorages. Coordinate requirements with Architectural Woodwork shop drawings for fixtures installed in countertops and cabinets. Furnish templates for use in woodwork shop.

C. Wiring Diagrams: Submit manufacturer's electrical requirements and wiring diagrams for power supply to units. Clearly differentiate between portions of wiring that are factory installed and field installed portions.

D. Color Charts: Submit manufacturer's standard color charts for fixture colors.

1.03 QUALITY ASSURANCE

A. Plumbing code compliance: Comply with applicable portions of New York State Uniform Fire Protection and Building Code, especially Article 9, Plumbing Requirements, and any local codes or regulations that apply pertaining to plumbing material, and the 2020 IPC.

B. New York State Law plumbing fixtures to comply with New York State Conservation Law 15-0314.

1. Lavatory faucets: 0.5 gpm self-closing faucet, or a metering faucet which limits discharge to a maximum of 0.25 gallons per cycle.
2. Sink faucets: 2.2 gpm.
3. Urinal flush valves: .5 gal. per flush.
4. Water closets: 1.3 gal. per flush.
5. Shower Head: 2.0 gpm

C. Plumbing fixture standards: Comply with applicable portions of National Standard Plumbing Code pertaining to materials and installation of plumbing fixtures.

D. Codes and Standards

1. ASHRAE Standard 18: "Method of Testing for Rating Drinking Water Coolers with Self-Contained Mechanical Refrigeration Systems.
2. Add NSF Lead Free
3. ARI Standard 1010: "Self-Contained Mechanically-Refrigerated Drinking-Water Coolers".
4. ICC Standard A117.1-09: "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".
5. Public Law 90-480: "Architectural Barriers Act of 1968".
6. UL Standard 399: Standard for “Drinking-Water Coolers".
7. Public Law 101-336: "Americans with Disabilities Act".
8. ANSI A117.1 – Accessible and Usable Buildings and Facilities
9. ASHRAE Std 18 – Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
10. ASME A112.6.1M – Supports for Off-the Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).
11. ASME A112.18.1 – Plumbing Supply Fittings; 2012.
12. ASME A112.19.2 – Ceramic Plumbing Fixtures; 2013.
13. ASME A.112.19.3 – Stainless Steel Plumbing Fixtures (Designed for Residential Use); 2008 (R2013).
14. ASME A112.19.5 – Flush Valves and Spuds for Water Closets, Urinals, and tanks; 2011
15. NSF 61 – Drinking Water System Components – Health Effects; 2014 (Errata 2015).
16. NSF 372 – Drinking Water System Components – Lead Content; 2011

1.04 DELIVERY, STORAGE AND HANDLING

A. Store fixtures where environmental conditions are uniformly maintained within the manufacturer's recommended temperatures to prevent damage.

B. Store fixtures and trim in the manufacturer's original shipping containers. Do not stack containers or store in such a manner that may cause damage to the fixture on trim.

1.05 SEQUENCE AND SCHEDULING

A. Schedule rough-in installations with the installation of other building components.

PART 2 – PRODUCTS

2.01 PLUMBING FIXTURES

A. General: Type, style, and material indicated, including stops, valves, faucets, strainers, wastes, escutcheons, bolts, screws, bushings, etc.

B. Fixtures of same type must be furnished by single manufacturer.

2.02 MATERIALS

A. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.

B. Fittings, trim and accessories to be copper or brass unless otherwise noted.

1. Exposed or semi-exposed: Bright chrome-plated units.
2. Escutcheons: Cast brass, bright chrome-plated with set screw.

C. Stainless steel sheets: ANSI/ASTM A 167, Type 302/304, hardest workable temper.

1. Finish: No. 4, bright, directional polish on exposed surfaces.

D. Steel sheets for baked enamel finish: ANSI/ASTM A 591, coating Class C, galvanized bonderized.

E. Steel sheets for porcelain enamel finish: ANSI/ASTM A 424, commercial quality, Type I.

F. Galvanized steel sheet: ANSI/ASTM A 526, except ANSI/ASTM A 527 for extensive forming, ANSI/ASTM A 525, G90 zinc coating, and chemical treatment.

G. Vitreous china: High quality, free from fire cracks, spots, blisters, pinholes and specks, glaze exposed surfaces, and test for crazing resistance in accordance with ANSI/ASTM C 554.

H. Fiberglass: ANSI Z 124, smooth surfaced, with color selected by Architect/Engineer.

I. Synthetic stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.

J. Manufacturer

1. Fixtures: American Standard, Crane, Kohler, Eljer.
2. Flush valves: American Standard, Sloan.
3. Closet seats: Church, Beneke, Bemis.
4. Chair carriers: Josam, Smith, Zurn.
5. Supplies and traps: Fixture manufacturer or McGuire, Eastman Central D, Brass Craft, Bridgeport Brass.
6. Master mixing valves: Powers, Symmons, Leonard.

2.03 PLUMBING FITTINGS, TRIM & ACCESSORIES

A. Refer to the “Plumbing Fixture Schedule” on the contract drawings for plumbing fixture manufacturer / model number information.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design and the referenced standards.

B. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures.

C. Examine walls, floors and cabinets for suitable conditions where fixtures are to be installed.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install plumbing fixtures level and plumb in accordance with fixture manufacturer's written instructions, rough-in drawings and pertinent codes and regulations, the original design and the referenced standards.

B. Comply with the installation requirements of ICC Standard A117.1, Public Law 90-480 and Public Law 101-336 with respect to plumbing fixtures for the physically handicapped.

1. Water closets flush valve handle on open side of fixtures.
2. Insulate water supply and drain pipes under wheelchair accessible lavatories and sinks or as otherwise shown on drawings.

C. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.

D. Set following in a leveling bed of cement grout.

1. Mop sinks.
2. Tubs.

E. Install a Lead Free stop valve in an accessible location in the water connection to each fixture.

F. Install escutcheons at following locations:

1. Wall penetrations, exposed finished locations.
2. Floor penetrations, exposed finished locations.
3. Ceiling penetrations, exposed finished locations.
4. Within cabinets and millwork.

G. Seal fixtures to walls and floors using silicone sealants or latex caulking. Match sealant color to fixture color.

H. Install a sediment trap at each sink or grouping of sinks in Art Rooms. Install so that trap may be easily serviced and removed.

3.03 EQUIPMENT TO BE FURNISHED BY OTHERS

A. Make complete plumbing connections to fixtures and equipment to be furnished by others. Secure exact locations and roughing-in dimensions before beginning work.

B. Provide approved supplies with stops and escutcheons, cast brass traps and wastes with CO plug and escutcheon.

C. All exposed piping chrome plated.

D. Equipment shall be chrome plated except piping located below equipment.

3.04 FIELD QUALITY CONTROL

A. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized.

B. Inspect each installed unit for damage and operation. Replace damaged or faulting operating fixtures.

3.05 CLEANING

A. Clean fixtures, trim and strainers using manufacturer's recommended cleaning methods and materials.

3.06 PROTECTION

A. Provide protective covering for installed fixtures, water coolers and trim.

B. Do not allow use of fixtures for temporary facilities unless expressly approved in writing by the Owner.

3.07 SPARE PARTS

A. Furnish special wrenches, water filters and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt in a quantity of one device for each 10 fixtures.

B. Furnish faucet repair kits complete with all necessary washers, springs, pins, and retainers, packings, O-rings, sleeves and seats in a quantity of 1 kit for each 40 faucets.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230000 – GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. This Section contains General Provisions related specifically to the Mechanical Work.

1. Quality Assurance.
2. Terminology.
3. Protection.
4. Coordination and Sequencing.
5. General Completion.
6. Demolition.
7. Cutting and Patching.
8. Excavation for Mechanical Work.
9. Concrete for Mechanical Work.

B. Drawings and General Provisions of Contract, including General and Supplementary Conditions, apply to this section.

1.02 QUALITY ASSURANCE

A. Laws, Permits, Inspections.

1. Comply with latest revisions of New York State Uniform Fire Protection and Construction Code, NYSED Manual of Planning Standards, any Local Codes or Regulations that apply.
2. Underwriters Laboratories label required for all electrical materials carrying 50 volts or more.
3. Comply with New York State Energy Conservation Construction Code.
4. Comply to requirements of drawings and specifications that are in excess of governing codes.
5. Comply with Section 1613 of the New York State Building Code for seismic requirements.
6. Do not install work as specified or shown if in conflict with governing code. Notify Engineer and request direction.
7. Pay all Inspection and Permit fees.
8. Provide Certificate of Inspection from all governing authorities.

B. Reference to technical society, organization, body or section made in accordance with the following abbreviations:

1. AIA American Institute of Architects
2. AMCA Air Moving and Conditioning Association, Inc.
3. ANSI American National Standards Institute.
4. ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
5. ASME American Society of Mechanical Engineers
6. ASTM American Society of Testing Materials
7. AWSC American Welding Society Code
8. AWWA American Water Works Association
9. IEEE Institute of Electric and Electronics Engineers
10. NEC National Electric Code
11. NEMA National Electrical Manufacturer's Association
12. NFPA National Fire Protection Association
13. NYBFU New York Board of Fire Underwriters
14. NYCRR - Codes, Rules and Regulations of the State of New York.

15. NSF - National Sanitation Foundation
16. PDI - Plumbing and Drainage Institute.
17. SMACNA Sheet Metal and Air Conditioning Contractors National Association
18. UL Underwriters' Laboratories, Inc.

C. Contractor submission of equivalent or substitute items other than those specified is at Contractor convenience only. If a substitution or equivalent is accepted, the Contractor shall coordinate the installation of the substitute or equivalent and make all associated changes required. The Contractor also waives any claim for additional costs associated with the substitute / equivalent which becomes apparent before, during or after installation. The Contractor agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution / equivalent.

D. The Contractor shall, as part of his contract, furnish and install all equipment, materials, wiring accessories, and on-site installation of equipment as required by current standards of good practice.

E. All materials and equipment to be furnished and installed shall be new and of first quality and be free from all defects.

1.03 TERMINOLOGY

A. The following terminology and definitions are used on this project as related to the Mechanical Work.

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces and tunnels.
2. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
5. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
6. Sewers: Refer to underground connections from building to street mains. Sewers begin at points 5 feet outside building wall.
7. Service Connections: Refer to underground connections from 5 feet outside building wall to street mains.
8. Underground Lines: Refer to piping buried in earth inside and within 5 feet outside building.
9. Building Lines: Refer to all other lines.
10. For other definitions refer to latest issue of New York State Plumbing Code, and all revisions.

1.04 PROTECTION

A. Protect equipment from damage, including water, chemical, mechanical injury and theft.

B. Replace damaged equipment or components.

C. Close and waterproof between sleeves, openings, pipes and voids in walls, floors and foundations to prevent entrance of water or moisture.

D. Holes made in fire walls, partitions, fire stops, shall be patched to maintain fire rating integrity.

E. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.

F. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

G. Protect flanges, fittings, and piping specialties from moisture and dirt.

H. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

I. If permanently installed air handler equipment/systems are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used in each unit and at each return air grille/opening, as determined by ASHRAE 52.2 Replace all unit filtration media with a Minimum Efficiency Reporting Value (MERV) of 13 immediately prior to occupancy and verify ductwork cleanliness; if ductwork is found contaminated, clean ductwork and associated air handling equipment and replace filtration media.

1.05 COORDINATION AND SEQUENCING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for chases, slots and openings in building structure during progress of construction, to allow for mechanical installations.

C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors shall be submitted and approved by the engineer.

G. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

H. Coordination with other trades: Right-of-Way as follows:

1. Light Fixtures.
2. Drain Pipes and Vents.
3. Ductwork.
4. HVAC Piping.
5. Domestic Water Piping.
6. Electrical Conduit.

I. Work in existing building.

1. Verify existing locations of pipe, ductwork equipment and conduit in field.

2. Extend existing systems as required for proper tie-in to new systems.
3. Leave existing equipment to be reused in satisfactory working order.
4. Remove from building all existing piping, ductwork, equipment and similar items which do not conform to new layout. Before disposing of these items, determine if Owner wishes to retain them.

J. Changeovers and continuity of services.

1. Make changeovers, tie-ins, removal, and perform similar work that affect operation of present building at times approved by Owner.
2. Make temporary connections required to keep present building systems and equipment in operation.
3. Prior to any shutdown of present building, have necessary materials at site.

1.06 GENERAL COMPLETION

A. Oiling Equipment.

1. Lubricate equipment and motors in accordance with manufacturer's requirements.

B. Instructions to Owner's Representative.

1. Give notice to Engineer when all systems are installed and operating.
2. Obtain name of Owner's Representative to receive instructions.
3. Schedule instructions of Owner's Representative by manufacturer's representative and instruct Owner in system installation and operation for:

a. Heating, Ventilating & Air Conditioning Equipment.
b. Fan equipment.
c. Pumps.
d. Temperature control.
e. Equipment lubrication.
f. Packaged systems.

C. Provide Operation and Maintenance manuals in accordance with the requirements of Division 01 "Project Closeout" Section. Provide an instructional video to the owner of the training / maintenance instruction sessions with the owner.

1.07 PAINTING AND FINISHING

A. Refer to "Painting" Section 099000 for field painting requirements.

B. Damage and Touch-up: Repair marred and damaged factory painted finishes with materials and procedures to match original factory finish.

1.08 DEMOLITION

A. Disconnect, demolish, and remove work specified under Division 23 and as indicated.

B. Where pipe, ductwork, insulation or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

D. Abandoned Work: Cut and remove buried pipe abandoned in place, 2 inches beyond the face of adjacent construction. Cap and patch surface to match existing finish.

E. Removal: Remove indicated equipment from the project site.

F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation. Add cap off and pressure test prior to putting back in service.

1.09 CUTTING AND PATCHING

A. All cutting required to facilitate the proper installation of all work to be installed under Division 23, shall be done by the Mechanical Contractor.

B. Cut, channel, chase and drill floors, walls, partitions, ceilings and other surfaces necessary for mechanical installations in the maner specified and approved by the architect. Perform cutting by skilled mechanics of the trades involved.

C. Repair cut surfaces to match adjacent surfaces.

1.10 EXCAVATION FOR MECHANICAL WORK

A. Description of Work: Types of excavation for mechanical related work specified in this section include:

1. Underground mechanical utilities and services.
2. Underground tanks, casings and equipment enclosures.
3. Exterior water circulation and distribution systems.

B. Project Conditions.

1. Locate and protect existing utilities and other underground work in manner which will ensure that no damage or service interruption will result from excavating and backfilling. Liabilities arising out of performance of work is responsibility of Contractor doing excavation.
2. Protect persons from injury at excavations by barricades, warnings, and illumination.
3. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install mechanical work on frozen excavation bases or subbases.

1.11 CONCRETE FOR MECHANICAL WORK.

A. Types of concrete for mechanical related work specified in this section include:

1. Lean concrete backfill to support mechanical work.
2. Encasement of mechanical work.
3. Mechanical equipment foundations and housekeeping pads.
4. Inertia bases for isolation of mechanical work.
5. Rough grouting in and around mechanical work.
6. Patching concrete cuts to accommodate mechanical work.
7. Thrust block.

1.12 REBATES

A. The Mechanical Contractor shall assist the Owner in applying for any available rebates from manufacturer’s, utility companies, etc. on equipment or materials installed under the contract. Provide all required documentation and assist in the completion of applications as required to complete the rebate process. All proceeds from rebates remain the property of the Owner.

PART 2 – PRODUCTS

Reference Section 033000.

PART 3 - EXECUTION

3.01 EXCAVATION - GENERAL

A. Do not excavate for mechanical work until work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum.

B. Excavate with vertical sided excavations to greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross bracing to sustain sides of excavation. Remove sheeting and cross bracing during backfilling wherever such removal would not endanger work or other property. Where not removed, cut sheeting off at sufficient distance below finished grade to not interfere with other work.

C. Width: Excavate for piping with 6" to 9" clearance on both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Excavate for other mechanical work to provide minimum practical but adequate working clearances.

D. Depth for direct support: For work to be supported directly on undisturbed soil, do not excavate beyond indicated depths, and hand excavate bottom cut to accurate elevations, undercut at pipe hubs.

E. Depth for subbase support: For large piping (6" pipe size and larger), tanks, and where indicated for other mechanical work, excavate for installation of subbase material in depth indicated or, if not otherwise indicated, 6" below bottom of work to be supported.

F. Depth for unsatisfactory soil or rock conditions: Where directed, (because of unsatisfactory conditions at bottom of indicated excavation), excavate additional depth as directed to reach satisfactory conditions. Backfill with subbase material, compacted as directed, to indicated excavation depth.

G. Store excavated material (temporarily) near excavation, in manner which will not interfere with or damage excavation or other work. Do not store under trees (within drip line).

1. Dispose of excavated material which is either in excess of quantity needed for backfilling, or does not comply with requirements for backfill material.

    a. Remove unused material from project site, and dispose of in lawful manner.

3.02 WATER CONTROL

A. Maintain dry excavations for mechanical work, by removing water. Protect excavations from inflow of surface water. Pump inflow of ground water from excavations, protect excavations from inflow of ground water, by installing temporary sheeting and waterproofing as well as dewatering as required. Provide adequate barriers which will protect other excavations and below grade property from being damaged by water, sediment or erosion from or through mechanical work excavations. Need permit for dewatering – contractor to obtain and pay for.

3.03 BACKFILLING (REFERENCE 310000)

A. Do not backfill until installed mechanical work has been tested and accepted, wherever testing is indicated.

B. Install drainage fill where indicated, and tamp to uniform firm density.

C. Backfill with finely graded subbase material to 6" above wrapped, coated and plastic piping and tanks, and to centerline of other tanks.

D. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

E. Backfill simultaneously on opposite sides of mechanical work, and compact simultaneously, do not dislocate work from installed positions.

F. Backfill excavations in 8" high courses of backfill material, uniformly compacted to the following densities (% of maximum density, ASTM D1557), using power-driven hand operated compaction equipment.

1. Lawn and landscaped areas: 85% for cohesive soils, 90% for cohesionless soil.
2. Paved areas and roadways: 90% for cohesive soils, 95% for cohesionless soils.

G. Backfill to elevations matching adjacent grades, at time of backfilling excavations for mechanical work. Return surfaces to original condition.

H. After covering piping with 6" layer of approved fill, employ General Contractor to backfill, compact excavations beneath:

1. New foundations.
2. Slabs on grade.
3. Areas to be paved by General Contractor.

3.04 CONCRETE BASES

A. Construct concrete equipment bases of dimensions required, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations.

3.05 CONCRETE GENERAL

Reference Section 033000.

3.06 CONCRETE CURING AND PROTECTION

Reference Section 033000.

3.07 MISCELLANEOUS CONCRETE ITEMS

A. Fill in holes and openings left in concrete structures for passage of work by trade unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.08 CONCRETE SURFACE REPAIRS (REFERENCE 030130)

A. Repair and patch areas with epoxy or non-shrink grout immediately after removal of forms, when acceptable to Architect/Engineer.

B. Repair areas, except single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

C. Use epoxy-based mortar for structural repairs, where directed by Architect/Engineer.

D. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.09 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Quality Control: Owner's acceptable testing laboratory will perform sampling and testing during concrete placement, which may include the following, as directed by Engineer. This testing does not relieve Contractor of responsibility of providing concrete in compliance with specifications. Contractor shall perform additional testing as necessary, at no expense to Owner, to ensure quality of concrete.

1. Sampling Fresh Concrete: ASTM.
2. Slump: ASTM, one test for each load at point of discharge.
3. Air Content: ASTM C 173, one for each set of compressive strength (specimens of freshly mixed concrete).
4. Compressive Strength: ASTM, one set for each 50 cu. yds. or fraction thereof of each class and type of concrete; 2 specimens tested at 7 days, 3 specimens tested at 28 days, and one retained for later testing if required.
5. Laboratory Cured Test Cylinders: ASTM.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230010 – CODES, STANDARDS, AND PERMITS

PART 1 – GENERAL

1.01 GENERAL

The entire installation shall be made in accordance with State rules and regulations and shall also conform with the Standards of the National Board of Fire Underwriters for this installation and the local Board of Fire Underwriters having jurisdiction. The installation shall also comply with air pollution requirements of the State of New York and Industrial Code Rule 4 of the State of New York Department of Labor, Board of Standards and Appeals, dated March 31, 1965, and all other ordinances having jurisdiction.

The Contractor shall submit to all authorities having jurisdiction all required applications and shall secure all necessary permits, tests, and inspections required for final approval.

Certain standard and staple materials are described by reference to standard specifications. These standards are as follows:

ASA-B9	Safety Code for Mechanical Refrigeration
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWWA	American Water Works Association
CS	Commercial Standard
FS	Federal Specification
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
PDI	Plumbing and Drainage Institute
SMACNA	Sheet Metal and Air Conditioning Contractors Association
USASI	United States of America Standards Institute
UL	Underwriters' Laboratories
	New York State Uniform Fire Prevention and Building Code
A.A.B.C.	Associated Air Balance Council
N.E.B.B.	National Environmental Balancing Bureau
NYSED	Manual of Planning Standards (Latest Edition)

All new equipment shall bear U.L. label and conform to the latest edition of the National Electric code.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230300 – BASIC MECHANICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

1. Submittals.
2. Welder certification.
3. Pipe joining materials and installation instructions common to piping systems.
4. Piping specialties: Escutcheons, dielectric fittings, sleeves and seals.
5. Identifying devices and labels.
6. Nonshrink grout for equipment installations.
7. Drip pans.
8. Fire stopping.
9. Pipe supports: Hangers, clamps, support spacing, building attachments, shields and saddles, flashing, miscellaneous materials, anchors.
10. Field fabricated metal and wood equipment supports.

B. Pipe and pipe fitting materials are specified in piping system sections.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUBMITTALS

A. General - Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product data for following piping specialties:

1. Mechanical sleeve seals.
2. Identification materials and devices.

C. Samples of color, lettering style and other graphic representation required for each identification material and device.

D. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

E. Coordination drawings for access panel and door locations.

F. Prepare coordination drawings to a 1/4 inch equals 1 foot scale or larger. Detail major elements, components and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the Work. Include the following:

1. Proposed locations of piping, ductwork, equipment and materials. Include the following:

a. Planned piping layout, including valve and specialty locations and valve stem movement.
b. Planned duct systems layout, including elbows radii and duct accessories.
c. Clearances for installing and maintaining insulation.
d. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
e. Equipment service connections and support details.
f. Exterior wall and foundation penetrations.
g. Fire-rated wall and floor penetrations.
h. Sizes and location of required concrete pads and bases.

G. Floor plans, elevations and details to indicate penetrations in floors, walls and ceilings and their relationship to other penetrations and installations.

H. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

I. Submit weld procedure specifications.

1.04 WELD AND WELDER CERTIFICATION

A. Welder certificates signed by Contractor certifying that welders comply with requirements of this Section.

B. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code - Steel".

1. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".

1. Comply with provisions of ASME B31 Series "Code for Pressure Piping".

1.05 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. All materials and workmanship shall, at a minimum be in accordance with (in no order of precedence):

1. New York State Codes – latest edition as adopted by the Authority Having Jurisdiction, unless otherwise noted.

2. State and municipal Building Codes and related subcodes.

3. Occupational and Safety Act (OSHA) Requirements.

4. Rules and Regulations of the Authority Having Jurisdiction applicable to the work.

5. National Electrical Standards Association Standard for Good Workmanship in Electrical Construction (NECA-1)

6. Serving utility’s rules and regulations for providing service.

7. Contract Drawings and Specifications.

8. Manufacturer recommended installation instructions, practices and procedures for the products being utilized or installed.

9. Where conflicts arise between the above, the more stringent requirement shall be adhered to.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods. Joining methods and pipe installation shall be performed in complete accordance with section 1613 of the Building Code of New York State for building seismic type II, zone C.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.02 PIPE JOINING MATERIALS

A. Refer to individual piping system specification Sections in Division 23 for special joining materials not listed below.

B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8 inch maximum thickness, except where thickness or specific material is indicated.

    a. Full-Face Type: for flat-face, Class 125 cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: for raised-face, Class 250 cast-iron and steel flanges.

2. ASME B16.20 for grooved, ring-joint, steel flanges. Note that grooved, ring joint piping / accessories may be used for sprinkler or condenser water piping systems only.

3. AWWA C110, rubber, flat face, 1/8 inch thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

D. Solder Filler Metal: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95 percent) and silver (approximately 5 percent).
2. Alloy E: Tin (approximately 95 percent) and copper (approximately 5 percent).
3. Allow HA: Tin-antimony-silver-copper-zinc.
4. Alloy HB: Tin-antimony-silver-copper-nickel.
5. Alloy Sb5: Tin (95 percent) and antimony (5 percent).

E. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

F. Welding Fill Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Flanged, Ductile-Iron Pipe Gasket, Bolts and Nuts: AWWA C110, rubber gasket, carbon steel bolts and nuts.

H. Couplings: Iron body sleeve assembly, fabricated to match outside diameters of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47, Grade 32510 or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.03 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling and floor plates; deep-pattern type, where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube and insulation of insulated piping.
2. Outside Diameter: Completely cover opening.
3. Cast Brass: One-piece, with set-screw.

    a. Finish: Rough brass.
    b. Finish: Polished chrome plate.

4. Cast Brass: Split casting, with concealed hinge and set-screw.

    a. Finish: Rough brass.
    b. Finish: Polished chrome plate.

5. Stamped Steel: One-piece, with set screw and chrome plated finish.
6. Stamped Steel: One-piece with spring clips and chrome plated finish.
7. Stamped Steel: Split plate with concealed hinge, set-screw, and chrome plated finish.
8. Stamped Steel: Split plate with concealed hinge, spring clips and chrome plated finish.
9. Cast-Iron Floor Plate: One piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
2. Insulating Material: Suitable for system fluid, pressure and temperature.
3. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F temperature.
4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system pressures.
5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers and steel backing washers.

    a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.

6. Dielectric Couplings: Galvanized steel coupling, having inert and non-corrosive, thermoplastic lining, with threaded ends and 300 psig minimum working pressure at 225 deg F temperature.

7. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive, thermoplastic lining, with combination of plain or threaded end types and 300 psig working pressure at 225 deg F temperature.

C. Mechanical Sleeve Seals: Modular, watertight, mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab and roof penetrations.

1. Steel Sheet-Metal: 24 gage or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast-Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.
4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.

    a. Penetrating Pipe Deflection: In accordance with the Building Code of New York State (latest edition), Chapter 16: seismic requirements, without leakage.
    b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111 of housing and gasket size as required to fit penetrating pipe.
    c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
    d. Housing-to-Sleeve Gasket: Rubber or neoprene, push-on type, of manufacturer's design.

5. Cast-Iron Sleeve Fittings: Commercially-made, sleeve having integral clamping flange, with clamping ring, bolts and nuts for membrane flashing.

    a. Underdeck Clamp: Clamping ring with set screws.

2.04 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 23 Sections. Where more than single type is specified for listed application, selection is Installer's option, but provide single selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
2. Location: An accessible and visible location.

C. Snap-On Plastic Pipe Markers: Manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, conforming to ASME A13.1.

D. Pressure-Sensitive Pipe Markers: Manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1.

E. Plastic Duct Markers: Manufacturer's standard laminated plastic, color coded duct markers. Conform to following color code:

1. Green: Cold air.
2. Yellow: Hot air.
3. Yellow/Green: Supply air.
4. Blue: Exhaust, outside, return and mixed air.
5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
6. Nomenclature: Include following:

a. Direction of air flow.
b. Duct service (supply, return, exhaust, etc.).
c. Duct origin (from).
d. Duct destination (to).
e. Design cfm.

F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock: Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated.

1. Fabricate in sizes required for message.
2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
3. Punch for mechanical fastening.
4. Thickness: 1/16 inch, except as otherwise indicated.
5. Thickness: 1/8 inch, except as otherwise indicated.
6. Thickness: 1/16 inch, for units up to 20 square inches or 8-inches long; 1/8 inch for larger units.
7. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.

G. Plastic Equipment Markers: Laminated-plastic, color-coded equipment markers. Conform to following color code:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Yellow/Green: Combination cooling and heating equipment and components.
4. Brown: Energy reclamation equipment and components.
5. Blue: Equipment and components that do not meet any of above criteria.
6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
7. Nomenclature: Include following, matching terminology on schedules as closely as possible:

a. Name and plan number.
b. Equipment service.
c. Design capacity.
d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.

8. Size: Approximately 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.

H. Underground Type Plastic Line Marker.

1. Manufacturer's standard permanent, bright colored, continuous printed plastic tape, intended for direct burial service, not less than 6" wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried pipe.

I. Lettering and Graphics: Coordinate names, abbreviations and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

1. Multiple Systems: Where multiple systems of same generic name are indicated, provide identification that indicates individual system number as well as service such as "Boiler No. 3", "Air Supply No. 1H", or "Standpipe F12".

2.05 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory-packaged.

2.06 DRIP PANS

A. Provide drip pans fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inches. Reinforce top, either by structural angles or by folding over according to size. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

2.07 FIRE STOPPING

A. Refer to Specification Section 230680 for details.

2.08 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. General: Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports. Supports and hangers in conformance with the Building Code of New York State (latest edition), Chapter 16: seismic requirements shall be used. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper plated hangers and supports for copper piping systems. Provide spring hangers where piping is subject to vibration movement.

B. Adjustable steel clevises.

1. Material: Carbon steel, copper plated for copper piping.
2. Finish: Black or copper plated.
3. Adjustment: Hanger to be adjustable for vertical height of pipe without removing the pipe.

2.09 VERTICAL PIPING CLAMPS

A. Two bolt riser clamp.

1. Material: Carbon steel copper plated for copper piping.
2. Finish: Black or copper plated.

2.10 HANGER ROD AND SPACING

ROD SIZE AND SPACING SCHEDULE (In accordance with NYSBC 1621)

PIPE SIZE	ROD DIAMETER
2" and smaller	3/8"
2-1/2" thru 3-1/2"	1/2"
4" thru 5"	5/8"
6" and over	3/4"

TYPE	MAXIMUM SPACING
Steel	10’ -0"
Copper	6’- 0"

Note: Cast Iron - support at every hub or coupling 5 ft. maximum spacing.

2.11 BUILDING ATTACHMENTS

A. General: Except as otherwise indicated provide factory fabricated building attachments of one of the following types listed, selected by Installer to suit building substrate conditions. Select size of building attachments to suit hanger rods. Provide copper plated building attachments for copper piping systems. Provide the following where approved by Building Code of New York State (latest edition), Chapter 16:

B. On Structural Steel:

1. For pipes 2" and smaller: C clamps with lock nuts similar to Grinnell figure 86.
2. For pipes 5" and larger: Use beam clamps similar to Grinnell figure 228 or 292.

C. On New Masonry:

1. Use concrete inserts similar to Grinnell figure 281.

D. On Existing Concrete:

1. Use expansion case similar to Grinnell figure 117.

E. On Wood:

1. Use coach screw rods Grinnell figure 111. Ceiling flanges Grinnell figure 153, or fabricated angle clips. Use wood drive screws or lag bolts as fasteners.

2.12 SHIELDS AND SADDLES (Where approved by the Building Code of New York State (latest edition), Chapter 16:)

A. General: For insulated piping.

B. Shields: 16 gauge galvanized metal.

Unsul Coustic Corp. "Insul-Shield"

C. Protection saddles:

1. Hardwood block
2. Steel saddle Grinnell 160 series

2.13 FLASHING MATERIALS

A. General: Provide flashings for each penetration of mechanical systems through roofs or waterproof membranes.

B. Molded Pipe Flashing: Compatible with single ply membranes with which it is used and manufactured by membrane manufacturer.

C. Copper flashing: Provide cold-rolled sheet copper (ANSI/ASTM B 370), of proper temper for applications shown and required forming, coated on one side with not less than 0.06 lbs. per sq. ft. of antimony (ANSI/ASTM B 101, Type I, Class A), weighing 1.06 lbs. per sq. ft., except as otherwise indicated.

D. Bituminous coating: FS TT-C-494, or MIL-C-18480, or SSPC-Paint 12, cold applied solvent type bituminous mastic coating for application in dry film thickness of 15 mils per coat.

2.14 MISCELLANEOUS MATERIALS

A. Metal framing: Provide products complying with NEMA STD ML 1.

B. Steel plates, shapes and bars: Provide products complying with ANSI/ASTM A 36.

C. Heavy duty steel trapezes: Fabricate from steel shapes selected for loads required, weld steel in accordance with AWS standards.

D. Pipe guides: Provide factory fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two section outer cylinder and base with a two section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.15 ANCHORS

A. Fabricate pipe anchors from 3 x 3 x 1/2" angle.

B. Use pipe protection saddles one size larger than piping.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: All piping systems, components and their installation shall be in conformance with the Building Code of New York State (latest edition), Chapter 16: for seismic requirements. Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 23 specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordinate drawings.

C. Install piping at indicated slope.

D. Install components having pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

H. Install piping tight to slabs, beams, joists, columns, walls and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's printed instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wallboard partitions and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw and polished chrome-plated finish. Use split-casting escutcheons where required, for existing piping.
2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips and chrome-plated finish.
5. Piping in Utility Areas: Cast-brass or stamped-steel with set-screw or spring clips.

N. Sleeves are required for core drilled holes.

O. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs and where indicated.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.

2. Build sleeves into new walls and slabs as work progresses.

3. Install large enough sleeves to provide 1/4 inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. Steel Sheet-Metal Sleeves: For pipes 6 inches and larger, penetrating gypsum-board partitions.
    b. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Flashing is specified in Division 7 Section "Flashing and Sheet Metal".
    c. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants specified in Division 7 Section "Joint Sealants".

Q. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeve and mechanical sleeve seals. Size sleeve for 1 inch annular clear space between pipe and sleeve for installation of mechanical seals.

1. Install steel pipe for sleeves smaller than 6 inches.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger.
3. Assemble and install mechanical seals according to manufacturer's printed instructions.

R. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.

S. Below Grade, Exterior Wall, Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

V. Piping Joint Construction: Joint pipe and fittings as follows and as specifically required in individual piping system specification Sections.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS "Soldering Manual", Chapter 22 "The Soldering of Pipe and Tube".
4. Brazed Joints: Construct joints according to AWS "Brazing Manual", Chapter 28 "Pipe and Tube".
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:

    a. Note the internal length of threads in fittings or valve ends and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

W. Welded Joints: Construct joints according to AWS D10.12 "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to "Quality Assurance" article.

X. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

1. Fitting Heat-Fusion Joints: Prepare pipe and fittings and join with heat-fusion equipment, according to manufacturer's printed instructions.

    a. Plain-End Pipe and Socket-Type Fittings: Socket-joining.

Y. Piping Connections: Except as otherwise indicated, make piping connections as specified below.

1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2 inches or smaller threaded pipe connection.
2. Install flanges, in piping 2 1/2 inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials or dissimilar metals.
4. Wet Piping Systems (Water and Steam): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom, where mounting heights are not indicated. Equipment platforms, vibration isolation and restraints shall be provided and installed where described and shall be in conformance with Building Code of New York State (latest edition), Chapter 16:

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

D. Install mechanical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.03 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on pipe insulation segment where required for hot non-insulated pipes.

2. Locate pipe markers as follows wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

    a. Near each valve and control device.
    b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
    c. Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
    d. At access doors, manholes and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.
    f. Spaced at a maximum of 50 feet intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
    g. On piping above removable acoustical ceilings, except omit intermediately spaces markers.

3. During back-filling/top-soiling of each exterior underground piping systems, install continuous underground type plastic line marker, located directly over buried line at 6-inches to 8-inches below finished grade. Where multiple small lines are buried in common trench and do not exceed overall width of 16-inches, install single line marker. For tile fields and similar installations, mark only edge pipe lines of field.

B. Equipment: Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment.

1. Lettering Size: Minimum 1/4 inch high lettering for name of unit where viewing distance is less than 2 feet, 1/2 inch high for distance up to 6 feet, and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.

2. Text of Signs: Provide text to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.

C. Duct Systems: Identify air supply, return, exhaust, intake and relief ducts with duct markers, or provide stenciled signs and arrows, showing duct system service and direction of flow.

1. Location: In each space where ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.

D. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Provide and install in conformance with the Building Code of New York State (latest edition), Chapter 16: Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel".

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 GROUTING

A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms for placement of grout, as required.

D. Avoid air entrapment when placing grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide a smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's printed instructions

3.07 DRIP PANS

A. Locate drip pans under piping passing over or within 3 ft. horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, and weld rods to

sides of drip pan. Brace to prevent sagging or swaying. Connect 1-inch drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

3.08 FIRESTOPPING

A. See section 230680 for additional fire stopping requirements.

3.09 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments at required locations in concrete, in wood or on structural steel for proper piping support. Space attachments within maximum piping span length indicated. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed, fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.10 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure. Supports / hangers shall conform to the requirements of the Building Code of New York State (latest edition), Chapter 16: Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Install hangers and supports of same type and style for grouped piping runs.

C. Support fire water piping independently of other piping.

D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

E. Provisions for movement: Building Code of New York State (latest edition), Chapter 16:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
2. Load distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Pipe slopes: Install hangers and supports to provide indicated pipe slopes.

F. Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.11 SHIELDS AND SADDLES FOR INSULATED PIPING

A. 4" and below use 16 gauge x 12 inch long shield with oversized hanger outside insulation.

B. 6" and above use hardwood protection saddle with 16 gauge x 18 inch long shield with oversized hanger outside insulation.

C. 6" and above use steel protection saddle. Fill void between shield and pipe with insulation. Cover with vapor barrier. Protect barrier with 16 gauge x 18 inch long shield with oversized hanger outside assembly.

3.12 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

D. Anchor spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.13 FLASHINGS

A. Manufacturer's recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being installed.

B. Coat back side of flashings where in contact with concrete and other cementitious substrates, by painting surface in area of contact with heavy application of bituminous coating, or by other permanent separation as recommended by manufacturer of metal.

C. On vertical surfaces, lap flashings minimum of 3".

D. On sloping surfaces, for slopes of not less than 6" in 12", lap unsealed flashings minimum of 6".

E. For embedment of metal flashing flanges in roofing or composition flashing or stripping, extend flanges minimum of 6" for embedment.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230400 – PAINTING OF MECHANICAL WORK

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Types of painting of mechanical related work specified in this section include the following:

1. Exposed piping systems.
2. Exposed ductwork systems.
3. Steel supports, hangers and rods.

B. The scope of painting to be applied as part of the work under Division 23 shall consist of the following:

1. Paint exposed mechanical work throughout entire project including piping, ductwork, and terminal HVAC equipment.
2. Paint uninsulated ductwork and equipment.
3. Paint exposed NON insulated pipe, black steel such as pipe hangers, supporting steel, tanks, and equipment having no prime or only a prime coat finish.

1.02 SUBMITTALS

A. Submit manufacturer's technical information, including analysis of ingredients and application instructions for products used in painting work.

B. Certification by the manufacturer that products supplied comply with State VOC Regulations

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver painting materials to job site in original, new and unopened containers bearing manufacturer's name and label showing the following information:

1. Name and title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for major pigments and vehicles.
4. Thinning instructions.
5. Application instructions.
6. Color name and number.

B. Store materials in approved fire-safe location with adequate ventilation. Area must be kept clean.

1.04 PROJECT CONDITIONS

A. Comply with governing regulations concerning use of and conditions for application of paint. Comply with manufacturer's recommendations and instructions. Do not apply paint in unfavorable conditions of temperature, moisture (including humidity) or ambient contamination (dust and other pollutants).

PART 2 - PRODUCTS

2.01 GENERAL PAINTING PRODUCT REQUIREMENTS

A. Painting products based on a system by Rust-Oleum. Equivalent systems by Devoe and Pratt and Lambert are acceptable.

B. Steel surfaces - normal temperatures:

1. First Coat - Rust-Oleum or equal Red Primer.
2. Second Coat - Rust-Oleum or equal Zinc Chromate Rust-Inhibitive Primer.
3. Third Coat - Rust-Oleum industrial enamels, finish color as directed.

C. Steel surfaces - elevated temperatures above 150 deg. F.

1. First Coat - Rust-Oleum or equal heat resistant primer.
2. Second Coat - Rust-Oleum or equal heat resistant aluminum.
3. Machinery, equipment and apparatus having factory applied prime coat shall be painted as specified above except omit first coat.

D. Exposed canvas on pipe and equipment insulation:

1. First Coat - Primer, Rust-Oleum primer-sealer.
2. Second and third coats - Rust-Oleum Acrylic Series.
3. Colors as directed.

E. Vehicles and thinners: Comply with governing regulations and recognized safe practices in handling, use and drying of paint vehicles and thinners. Compatibility of paint products is the Contractor's exclusive responsibility. Select paint products to ensure freedom from problems relating to vehicles and thinners of type and within limits recommended by paint manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

A. Clean surfaces before applying paint products. Remove oil and grease prior to mechanical cleaning. Comply with paint products manufacturer's instructions for surface cleaning and preparation.

B. Remove surface applied accessories which are not to be painted, and reinstall after completion of painting. Protect non-removable items not to be painted, by covering with paper or plastic film.

C. Ferrous metal surfaces: Remove mill scale and loose rust on surfaces which are not zinc coated or shop/factory prime coated.

1. Clean shop applied prime coats on metal surfaces, and repair (touch-up) prime coats wherever abraded or otherwise damaged, prior to application of paint system.

D. Zinc coated surfaces: Clean with non-petroleum based solvent. Wash with copper sulfate solution and flush with water, unless surface has been pre-treated, or unless treatment is not recommended by manufacturer of prime coat.

3.02 PAINT SYSTEM APPLICATION

A. Comply with manufacturer's recommendations for mixing or stirring paint products immediately before application.

B. Application limitations: Paint every accessible surface of each unit of work indicated to be painted, regardless of whether in location recognized as "concealed" or "exposed" except as otherwise indicated.

1. Omit painting of ductwork and insulated piping above removable ceilings, but apply paint system to pipe hangers, duct hangers and similar unprotected ferrous materials.
2. Omit painting on machined sliding surfaces and rotating shafts of equipment, and on nonferrous finished metals including chrome plate, stainless steel, special anodized aluminum, brass/bronze and copper, and on plastics and similar finished materials, except where specifically indicated to be color-coded by painting.
3. Omit painting on required name plates, labels, identification tags, signs, markers, printed instructions, performance ratings, flow diagrams and similar text and graphics, located within the scope of work indicated to receive paint application.
4. Omit specified prime coat of paint system for metal surfaces where surface has shop applied prime coat of equivalent quality. Apply prime coat on other surfaces to be painted, comply with paint manufacturer's instructions for prime coating where not otherwise indicated. Apply additional prime coats where suction spots or unsealed areas appear.

C. Apply paint in accordance with manufacturer's directions. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance.

D. Apply paint at edges, corners, joints, welds and exposed fasteners in manner which will ensure dry-film thickness equal to that of flat surfaces. Allow sufficient time between successive coats for proper drying (comply with manufacturer's drying instructions).

1. Number of coats: Number indicated is minimum number, apply as many coats as are necessary to cover.
2. Coating thickness: Apply paint in uniform coats without thinning in application thickness recommended by manufacturer for each coat.
3. Apply paint in smooth finish without noticeable texture, cloudiness, spotting, holidays, laps, brush marks, runs, sags, ripples, ropiness and other surface imperfections.

3.03 CLEAN UP AND PROTECTION, PAINTING

A. During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day. Do not leave in paint storage area.

B. Spattered surfaces: Upon completion of painting work, clean paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting work. Correct damage by cleaning, repairing or replacing and repainting as directed. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings installed for protection of work not to be painted, after completion of painting operations. At completion of work by other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

A. Internal electrical control devices that operate starters, controllers, etc. shall be furnished, installed, and wired under Division 23. Such devices shall be included but not necessarily limited to, devices connected to ducts, damper switches, float switches, electric thermostats, safety devices, limit switches, relays, push button controllers, selector switches, pilot lights, extra interlock contacts, etc.

B. Equipment starters and disconnects shall be provided by the mechanical contractor completely mounted and wired to internal controls and shall be wired to incoming and outgoing control connections. Should integral equipment starters, disconnects or control panels be shipped separately, the mechanical contractor shall be responsible for the proper installation and connections from equipment to same. Incoming and outgoing (line and load) power wiring to starters / disconnect switches shall be performed by the electrical contractor.

C. The integration of the existing temperature control system wiring and controls shall be the responsibility of the Contractor under Division 15. The Contractor shall be fully responsible for the satisfactory operation of new equipment with the temperature control system.

D. All control transformers, control devices, starters, and control wiring furnished shall be properly protected with fuse cutouts and fuses or circuit breakers to conform to the National Electric Code, latest edition. All work shall be performed by a licensed electrician.

E. Each piece of equipment shall be provided with permanent type laminated, black finish, white core, phenolic nameplate. Nameplates should indicate the name and number of the unit, voltage, and any interlock reference. Each starter furnished by the Contractor shall be provided with a permanent type laminated, black finish, white core phenolic nameplate. Nameplate shall indicate the name of the unit controlled and the voltage rating. Nameplate shall be secured with adhesives. Plastic tape type labels will not be accepted.

F. All equipment shall be provided with disconnect means (by Mechanical Contractor).

G. All wiring furnished and installed by the mechanical contractor shall be in strict accordance with the latest edition of the National Electrical Code and all State and Municipal Agencies having jurisdiction. Except as specified otherwise, minimum size wire shall be #14 AWG (control) and #12 AWG (power) and shall be run in rigid galvanized steel conduit except as noted hereinafter. All wire shall be Type THHN or as required by code. All conduit connections to motors shall be made with short lengths of neoprene jacketed galvanized flexible metallic conduit (liquitite).

H. All wire and cable shall be new, manufactured of soft drawn copper of not less than 98% conductivity, conforming to ASTM Specifications and the latest requirements of N.E.C. Wire, and cable shall have 600 volt insulation (unless otherwise noted or specified) of the type specified and shall be of the standard AWG sizes as called for on Drawings or specified.

I. The Contractor shall furnish all labor and material required for the installation of the systems. A brief description of the work is as follows:

   1. Furnish all electrical control wiring for the new equipment and controls.

   2. Contractor shall apply final finish to insure uniformity.

   3. All cutting, patching, and painting as required.

   4. All controls for units as hereinbefore specified and disconnect switches.

5. Testing of all mechanical contractor installed wiring as directed.

6. Contractor shall perform all work as stated on the documents for fire alarm fan shutdown for all new applicable equipment, unless noted otherwise.

7. Contractor shall obtain an approved independent electrical inspection certificate, covering all work performed by an electrical inspection agency serving the locality of the project.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230516 – EXPANSION COMPENSATION

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Expansion compensation products required for this project shall be provided and installed in accordance with section 1621 of the New York State Building Code.

B. Expansion compensation products specified in this section include:

1. Fabricated Expansion Loops.

2. Flexible Ball Pipe Joints.

3. Expansion Compensators.

1.02 QUALITY ASSURANCE

A. Refer to Division 01, for requirements pertaining to substitute materials and equipment.

B. Comply with standards of the Expansion Joint Manufacturer's Association (EJMA).

1.03 SUBMITTALS

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of expansion compensation product. Submit schedule showing manufacturer's figure number, size, and location on project.

B. Shop Drawings: Submit shop drawings for fabricated expansion loops indicating location, dimensions, pipe sizes and location and method of attachment of anchors.

C. Maintenance Data: Submit maintenance data and spare parts list for each type of expansion compensation product. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.01 EXPANSION LOOPS

A. General: Fabricate expansion loops as dimensioned and located on the Drawings and elsewhere as determined by installer to provide for adequate control of expansion of the installed piping system. Cold spring the loop prior to connecting to the anchored piping.

2.02 FLEXIBLE BALL PIPE JOINTS

A. General: Provide flexible ball pipe joints where indicated for piping systems, with materials and pressure/temperature ratings selected by Installer to suit intended service. Design joints for 360 degree rotation and with minimum of 30 degree angular flexing movement for sizes 1/4" to 6", 15 degrees for sizes 8" to 30". Provide 2 composition gaskets for each joint.

B. Certify carbon steel joints for environmental shock testing in accordance with MIL-S-4456 or MIL-S-901C.

C. Comply with Section II of ASME Boiler and Pressure Vessel Code and ANSI B31.1 Power Piping for materials and design of pressure containing parts and bolting.

D. Test each assembly with steam at working pressure of piping system for zero leaks before shipment.

E. Manufacturer: Subject to compliance with requirements, provide flexible ball pipe joints of the following:

1. Gustin-Bacon Div., Aeroquip Corp.

2.03 EXPANSION COMPENSATORS

A. Low Pressure: 70 psi, 3/4 inch to 3 inch copper pipe, 2 ply phosphor bronze bellows, brass shroud, male copper tube end.

B. High Pressure: 150 psi, 3/4 inch to 3/ inch steel pipe, 2 ply seamless stainless steel bellows, steel shroud and male thread end or psi, 3/4 inch to 3 inch copper pipe all bronze construction male thread or sweat ends.

C. Manufacturer: Subject to compliance with requirements, provide expansion compensators of one of the following:

1. Flexonics Div., UOP, Inc.
2. Keflex, Mfg. Div.
3. Metraflex Co.
4. Vibration Mountings and Controls, Inc.

2.04 PIPE ALIGNMENT GUIDES

A. General: Provide pipe alignment guides on both sides of expansion joints and elsewhere as indicated. Construct with 3 or 4 finger spider traveling inside a guiding sleeve, with provision for anchoring to building substrate.

B. Manufacturer: Subject to compliance with requirements, provide pipe alignment guides of the following:

1. Flexonics Div., UOP, Inc.
2. Keflex Mfg. Div.
3. Metraflex Co.

2.05 PIPE ANCHORS

A. General: Fabricated anchor, coupling with steel angle clips, teflon lined clamp sleeve, or shaped anchor for welding to pipe.

B. Manufacturer: Subject to compliance with requirements, provide anchors of the following:

1. Flexonics Div., UOP, Inc.
2. Keflex Mfg. Div.

PART 3 - EXECUTION

3.01 EXPANSION LOOPS

A. General: Fabricate expansion loops as indicated, in locations indicated, and elsewhere as determined by Installer for adequate expansion of installed piping system. Subject loop to cold spring which will absorb 50 percent of total expansion between hot and cold conditions. Provide pipe anchors and pipe alignment guides as indicated, and elsewhere as determined by Installer to properly anchor piping in relationship to expansion loops.

3.02 EXPANSION COMPENSATION FOR RISERS AND TERMINALS

A. General: Install connection between piping mains and risers with at least 5 pipe fittings including tee in main. Install connections between piping risers and terminal units with at least 4 pipe fittings including tee in riser.

3.03 PIPE ALIGNMENT GUIDES AND ANCHORS

A. General: Install alignment guides on both sides of each expansion joint or loop. Provide anchors secured to building structure as required.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230519 – METERS AND GAUGES FOR HVAC PIPING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Thermometers and gages specified in this section include the following:

1. Thermometers and fittings:
2. Pressure gages and fittings:

PART 2 - PRODUCTS

2.01 THERMOMETERS

A. Thermometers:

1. General: Provide and install adjustable, variable angle type thermometers of materials, capacities and ranges indicated.
2. Case: Die cast aluminum finished in baked epoxy enamel, glass front, 9 inches long.
3. Adjustable joint: 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
4. Tube and capillary: Blue liquid filled, magnifying lens, 1-percent scale range accuracy, shock mounted. (Mercury filled not acceptable).
5. Scale: Satin faced, non-reflective aluminum, permanently etched markings.
6. Stem: Copper plated steel, or brass, for separable socket.
7. Range: Conform to the following:

    a. Hot water: 30 to 240 degrees F with 2 degree F scale divisions.
    b. Chilled water: 30 to 180 degrees F with 2 degrees F scale divisions.

8. Manufacturer:

9. Wika
10. Trerice
11. Weiss
12. Or approved equal

B. Dial Thermometers:

1. General – Provide dial bimetal type adjustable angle thermometers of materials, capacities and ranges indicated, designed and constructed for use in service indicted.
2. Case – Type 300 series stainless steel hermetically sealed.
3. Dial – White finished aluminum with black and blue marking.
4. Pointer – balanced aluminum with black finish.
5. Stem – type 300 series stainless steel 1/4"o.d.internal bimetal coil silicone dampened.
6. Range – conform to the following:

    a. Hot water 20° to 240° F. scale divisions.

7. Manufacturer – subject to compliance with requirements, provide glass thermometers of one of the following:

a. Tel-Tru Mfg. Co.
b. Trerice (H.O.) Co.
c. Weiss Instrument Inc.

C. Thermometer wells:

1. General: Provide thermometer wells of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2 inch extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well.

2. Manufacturer: Same as thermometers.

2.02 PRESSURE GAGES AND FITTINGS

A. Pressure gages:

1. General: Provide "AA" industrial rated liquid filled pressure gages of capacities and ranges indicated, designed and constructed for use in service indicated. All pressure gauges shall be liquid filled unless otherwise specified. Provide gauge cocks for all pressure gauges.
2. Type: General use, 1/2 percent accuracy, ANSI B 40.1 grade A, phosphor bronze bourdon type, bottom connection.
3. Case: Aluminum or brass, glass lens, 4 1/2 inch diameter.
4. Connector: Brass with 1/4 inch male NPT. Provide protective syphon when used for steam service.
5. Scale: White coated aluminum, with permanently etched markings.
6. Range: Conform to the following:

a. Water - 0 - 100 psi.

7. Manufacturer - subject to compliance with requirements, provide pressure gages of one of the following:

a. Ametek, U.S. Gage Div.
b. Trerice
c. Weiss

B. Pressure gage accessories:

1. Gage cocks: Brass cock with 1/4 inch female NPT on each end, and "T" handle brass plug.
2. Syphon: 1/4 inch straight coil constructed of brass tubing with 1/4 inch male NPT on each end.
3. Snubber: 1/4 inch brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
4. Manufacturer: Same as gages.

PART 3 - EXECUTION

3.01 INSTALLATION OF THERMOMETERS

A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.

B. Locations: Install in the following locations and elsewhere as indicated:

1. At inlet and outlet of each hydronic zone 3-way valve.
2. At inlet and outlet of each hydronic boiler and chiller.

3. At inlet and outlet of each hydronic coil in air handling units, and built-up central systems.
4. At inlet and outlet of each hydronic heat exchanger.
5. At inlet and outlet of each hydronic heat recovery unit.
6. At inlet and outlet of each thermal storage tank.
7. At outlet of domestic hot water heater.
8. Common boiler supply and return header.

C. Thermometer wells: Install in piping tee where indicated, in vertical upright position. Fill well with Thermal grease.

3.02 INSTALLATION OF PRESSURE GAGES

A. General: Install pressure gages in piping tee with pressure gage cock, located on pipe at most readable position.

B. Locations: Install in the following locations, and elsewhere as indicated:

1. At suction and discharge of each hydronic pump.
2. At discharge of each pressure reducing valve.
3. At water service outlet.
4. At inlet and outlet of water side for condensers, chillers, and cooling towers.
5. System makeup water line.
6. Accessible hihg point of hydronic piping systems.

C. Pressure gage cocks: Install in piping tee with snubber or syphon if steam.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230523 – GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 23 sections.

B. Types of valves specified in this section include the following:

1. Gate valves.
2. Globe valves
3. Drain valves.
4. Ball valves.
5. Butterfly valves (where specifically approved by engineer only).
6. Check valves.

    a. Wafer Check (where specifically approved by engineer only).

1.03 QUALITY ASSURANCE

A. Marking of valves - comply with MSS SP-25.

B. Valve dimensions - for face-to-face and end-to-end dimensions of flanged or welding end valve bodies, comply with ANSI B16.10.

C. ASME Compliance: ASME 1331.9 for Building Services Piping.

D. Valve types. Provide valves of same type by same manufacturer.

1.04 SUBMITTALS

A. Product data - submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location and valve features for each required valve.

B. Maintenance data - submit maintenance data and spare parts lists for each type of valve. Include this data in Maintenance Manual.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle valves and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged valves or components, replace with new.

B. Store valves and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide factory fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated, provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is engineer's option.

B. Valve Features

1. Bypass- when shown provide manufacturer's standard bypass piping and valving.
2. Drain - when shown provide threaded pipe plugs complying with Division 15 "Hot & Chilled water piping" section.
3. Flanged - valve flanged complying with ANSI B16.1 (cast iron), ANSI B16.5, (steel), or ANSI B16.24 (bronze).
4. Threaded - valve ends complying with ANSI B2.1
5. Solder joint - valve ends complying with ANSI B16.18.
6. Trim - fabricate pressure containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry.
7. Renewable seat - design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.
8. Extended stem - increase stem length 2" minimum, to accommodate insulation applied over valve.

C. Valve Definitions

1. Mechanical actuator - factory fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve.
2. Bonnet - part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts union, or welding.
3. Solid wedge - one piece tapered disc in gate valve, designed for contact on both sides.
4. Outside screw and yoke (OS&Y) - stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.
5. Inside screw, non-rising stem - stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
6. Tight shutoff - butterfly valve designed for flow regulation, and manufactured to be tight in closed position.

2.02 GLOBE VALVES

A. Packing - select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

B. Composition discs - where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut. For metal seated globe valves, provide hardened stainless steel disc and seat ring.

C. Comply with the following standards:

1. Cast iron valves - MSS SP-85.
2. Bronze valves - MSS SP-80.
3. Steel valves - ANSI B16.34.

D. For HVAC hot and chilled water service:

1. Threaded ends 2" and smaller - Class 150, bronze body, union bonnet, rising stem, composition disc.
2. Soldered ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc.
3. Flanged ends 2 1/2" and larger - Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc.

E. Manufacturer - subject to compliance with requirements, provide globe valves of one of the following:

1. Jenkins Bros, A Corp.
2. Kennedy Valve
3. Stockham Valves and Fittings, Inc.

2.03 DRAIN VALVES

A. For low pressure drainage service:

1. Threaded ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
2. Soldered ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

B. Manufacturer - subject to compliance with requirements, provide drain valves of one of the following:

1. NIBCO, Inc.
2. Watts

2.04 BALL VALVES

A. Comply with the following standards:

1. Cast iron valves - MSS SP-72.
2. Steel valves - ANSI B16.34.

B. For HVAC hot and chilled water service:

1. Threaded ends 2" and smaller - Class 125, bronze 2 piece body, full port, bronze ball, bronze stem.
2. Soldered ends 2" and smaller - Class 125, bronze 2 piece body, full port, bronze ball, bronze stem.

C. Manufacturer - subject to compliance with requirements, provide ball valves of one of the following:

1. Jenkins Bros.
2. Stockham Valves & Fittings
3. Watts

2.05 BUTTERFLY VALVES (only where specifically approved by the engineer)

A. General - comply with MSS SP-67. Valves to be tight shutoff. Where butterfly valves are used as shutoffs for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8" and larger.

B. For HVAC hot and chilled water service:

1. Lug type 3" and larger - Class 150, ductile iron body, lever operated, cadmium plated ductile iron disc, Type 316 stainless steel stem, EPT or EPDM seat.

C. Manufacturer - subject to compliance with requirements, provide butterfly valves of one of the following:

1. Demco Inc.
2. Jenkins Bros., A Corp.
3. Mark Controls Corp., MCC Centerline.
4. Stockham Valves and Fittings, Inc.
5. Crane Co., Valve Division

2.06 WAFER CHECK VALVES (only where specifically approved by the engineer)

A. General - provide wafer style, butterfly type, spring actuated check valves designed to be installed with gaskets between two standard Class 125 flanges. Construct iron body valves with pressure containing parts of materials conforming to ANSI/ASTM A-126, Grade B. Support hanger pins on both ends by removable side plugs.

B. For water service:

1. 2" and larger - Class 125, cast iron body, stainless steel trim, bronze disc, Buna-N seal.

C. Manufacturer - subject to compliance with requirements, provide wafer check valves of one of the following:

1. Bell & Gossett, ITT Fluid Handling Div.
2. Metraflex Co.
3. NIBCO, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General - except as otherwise indicated, comply with the following requirements:

1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

B. Insulation - where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

C. Applications subject to shock - install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

D. Applications subject to corrosion - do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator. Install bronze valves in steam and condensate service and in other services where corrosion is indicated or can be expected to occur.

E. Mechanical actuators - install mechanical actuators with chain operators where indicated, and where valves 4" and larger are mounted more than 7'-0" above floor in mechanical rooms, boiler rooms, and where recommended by valve manufacturer because of valve size, pressure differential or other operating condition making manual operation difficult.

F. Selection of valve ends (pipe connections) - except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections.

1. Copper tube size 2" and smaller - soldered joint valves except ball valves used in plumbing systems.
2. Steel pipe, size 2" and smaller - threaded valves.
3. Pipe size 2 1/2" and larger - flanged valves.

G. Valve system - select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.

H. Non-metallic disc - limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

I. Renewable seats - select and install valves with renewable seats, except where otherwise indicated.

J. Fluid control - except as otherwise indicated, install gate, ball, globe, and butterfly valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe or butterfly valves.

K. Installation of Check valves: Wafer check valves – install between two flanges in horizontal or vertical position for proper direction of flow.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230548 – VIBRATION ISOLATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work specified in this section.

B. This section is a Division 23 Basic Materials and Methods section, and is a part of each Division 23 section making reference to vibration isolation products specified herein. Vibration isolation devices shall conform to the seismic requirements of the New York State Building Code. Isolators shall allow the amount of movement required by this code and shall be equipped with limit stops as required by this code.

1.02 DESCRIPTION OF WORK

A. Types of vibration isolation products specified in this section include the following:

1. Fiberglass Pad and Shapes
2. Neoprene Pads
3. Cork/Neoprene Pads
4. Equipment Rails
5. Fabricated Equipment Bases
6. Roof Curb Isolators
7. Isolation Hangers
8. Riser Isolators
9. Riser Support Isolators
10. Flexible Duct Connectors
11. Flexible Pipe Connectors

B. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 23 sections.

C. Refer to other sections of these specifications for equipment foundations, hangers, sealants, gaskets and other work related to vibration isolation work.

1.03 QUALITY ASSURANCE

A. Product qualification - provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years successful experience in production of units similar to those required for this project.

1.04 SUBMITTALS

A. Product data - submit manufacturer's specifications, detailed drawings, performance characteristics data and installation instructions for each type of unit required.

1. Include data for each type and size of unit, showing isolation efficiency, stiffness, natural frequency and transmissibility at lowest operating speed of equipment.
2. Where required, include independent test agencies certified report of test results for each type of unit.

3. For spring units, show wire size, spring diameter, free height, solid-compression height, operating height, fatigue characteristics and ratio of horizontal to vertical stiffness.
4. For spring and pad type units, show basis of spring rate selection for range of loading weights.
5. Include performance certifications where required.

B. Shop drawings - submit shop drawings showing structural design and details of inertia bases, steel beam bases and other custom fabricated work not covered by manufacturer's submitted data.

1. Furnish templates to fabricators of equipment bases, foundations and other support systems, as needed for coordination of vibration isolation units with other work.

C. Submit shop drawings indicating scope of vibration isolation work and locations of units and flexible connections. Include support isolation points for piping and ductwork including risers, air housings and inertia bases.

1. Include schedule of units, showing size or manufacturer's part number, and weight supported and resulting deflection of each unit.

PART 2 - PRODUCTS

2.01 ISOLATION MATERIALS AND SUPPORT UNITS

A. Fiberglass pads and shapes - glass fiber of not more than 0.18 mil diameter, produced by multiple-flame attenuation process, molded with manufacturer's standard fillers and binders through 10 compression cycles at 3 times rated load bearing capacity, to achieve natural frequency of not more than 12 Hertz, in thicknesses and shapes required for use in vibration isolation units.

B. Neoprene pads - oil resistant neoprene sheets, of manufacturer's standard hardness and cross ribbed pattern, designed for neoprene in shear type vibration isolation, and in thicknesses required.

C. Cork/Neoprene pads - close grained composition cork sheet, laminated between 2 sheets of ribbed oil resistant neoprene, in thicknesses required.

D. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 23 sections.

E. Refer to other sections of these specifications for equipment foundations, hangers, sealants, gaskets and other work related to vibration isolation work.

F. Equipment rails - where rails or beams are indicated for use with isolator units to support equipment, provide steel beams complying with ANSI/ASTM A36, with minimum depth of 6" or 0.08 x span of beam between isolators (whichever is greater). Provide welded bracket at each end of beams, and anchor each end to spring isolator unit. Provide bolt holes in beams matching anchor bolt holes in equipment. Provide beams of section modulus indicated or, if not indicated, selected for normal-weight equipment loading to limit static load stress to 16,000 psi.

1. Except as otherwise indicated, position equipment on equipment rails so that load will be equally supported by isolator units.

G. Fabricated equipment bases - where supplementary bases are indicated for use with isolator units to support equipment (base not integral with equipment), provide welded unit, fabricated of structural steel shapes, plates and bars complying with ANSI/ASTM A36, as shown. Provide welded support brackets at points indicated, and anchor base to spring isolator units.

H. Except as otherwise indicated, arrange brackets to result in the lowest possible mounting height for equipment. Provide bolt holes in base matching anchor bolt holes in equipment.

1. Where indicated, provide auxiliary steel base for support of motor, mounted on equipment base with slotted anchor bolt holes for adjustment of motor position.
2. Where sizes of base framing members are not indicated, fabricate base with depth of structure not less than 0.10 x longest span of base, rigidly braced to support equipment without deflections or distortions which would be detrimental to equipment or equipment performances.

I. Roof-curb isolators - fabricated frame units sized to match roof curbs as shown, formed with isolation springs between extruded aluminum upper and lower sections, which are shaped and positioned to prevent metal-to-metal contact. Provide continuous airtight and waterproof seal between upper and lower extrusions. Include provisions for anchorage of frame unit to roof curb, and for anchorage of equipment to unit.

J. Isolation hangers - hanger units formed with brackets and including manufacturer's standard compression isolators of type indicated. Design brackets for 5 times rated loading of units. Fabricate units to accept misalignment of suspension members, and for use with either rod or strap type members and including acoustical washers to prevent metal-to-metal contacts.

1. Provide vibration isolation spring with cap and pad type isolator, securely retained in unit.
2. Provide neoprene pad, securely retained in unit.
3. Provide fiberglass pad or shape, securely retained in unit, with threaded metal top plate.
4. Provide removable spacer in each unit, to limit deflection during installation to rated-load deflection.

K. Riser isolators - manufacturer's standard pad type isolator bonded to steel plate, formed for welding to pipe sleeve extension.

L. Riser support isolators - manufacturer's standard pad type isolator laminated between two formed steel plate members, one for welding to pipe sleeve extension and other for welding to pipe riser.

M. Flexible duct connectors - laminated flexible sheet of cotton duct and sheet elastomer (butyl, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated. Form connectors with full faced flanges and accordian bellows to perform as flexible isolation unit, and of manufacturer's standard length for each size unless otherwise indicated. Equip each unit with galvanized steel retaining rings for airtight connection with ductwork.

N. Flexible pipe connectors:

1. For non-ferrous piping, provide bronze hose covered with bronze wire braid with copper tube ends or bronze flanged ends, brase-welded to hose.
2. For ferrous piping, provide stainless steel hose covered with stainless steel wire braid with NPT steel nipples or 150 psi ANSI flanges, welded to hose.
3. Rubber flexible pipe connectors - provide of rubber and butyl construction with integral full faced duck and butyl flanges, internally steel wire reinforced, and furnished complete with steel retaining rings. Select with temperature and pressure ratings to suit intended service.
4. Manufacturer - subject to compliance with requirements, provide vibration isolation products of one of the following:

a. Korfund Dynamics Corp.
b. Mason Industries, Inc.
c. Vibration Eliminator Co., Inc.
d. Vibration Mountings and Controls, Inc.

PART 3 - EXECUTION

3.01 PERFORMANCE OF ISOLATORS

A. General - comply with minimum static deflections recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers, including definitions of critical and noncritical locations, for selection and application of vibration isolation materials and units as indicated.

B. Manufacturer's recommendations - except as otherwise indicated, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units.

3.02 APPLICATIONS

A. General - except as otherwise indicated, apply the following types of vibration isolators at indicated locations or for indicated items of equipment. Selection is Installer's option where more than one type is indicated.

B. Neoprene pad type isolators - install where the following equipment is indicated:

1. Floor mounted air handling units, in noncritical locations.
2. Rooftop units mounted on dunnage. (as well as internal spring isolator).

C. Equipment rails and spring isolators - install where the following floor mounted equipment is indicated:

1. Air handling units, 7 1/2 H.P. and larger.
2. Centrifugal fans, 7 1/2 H.P. and larger.

D. Fabricated equipment base and spring isolators - install where the following equipment is indicated:

1. Centrifugal fans.
2. Reciprocating refrigeration compressor, in noncritical locations.

E. Roof curb isolators - install where the following equipment is located on roof curbs over critical locations:

1. Air handling units.
2. Rooftop air conditioning units.
3. Fan or blower units, of more than 1.5 H.P.

F. Isolation hangers - install where the following suspended equipment is indicated:

1. Package air handling units.
2. Pipe over 1" pipe size, located in mechanical equipment rooms and each run connected to vibration isolation mounted equipment for a distance of 100 diameters but not less than 50' - 0".
3. Ductwork (except flexible ductwork), located in mechanical equipment rooms, and each run connected to vibration isolation mounted equipment for a distance of 50' - 0".
4. Sound traps in ductwork.
5. Ductwork, where air velocity is 3000 fpm or greater.

G. Riser isolators - install where the following risers pass through floors and roofs, provide support type where riser support is required:

1. Pipe risers.

2. Pipe risers, within 50' - 0" of connection with vibration isolation mounted equipment.
3. Pipe risers, in critical locations.
4. Pipe risers, 2" pipe size and larger, in critical locations.
5. Ductwork risers, in critical locations.
6. Ductwork risers, where air velocity is 3000 fpm or greater.
7. Ductwork risers, within 50' - 0" of connection with vibration isolation mounted equipment.

H. Flexible duct connectors - install at the following ductwork connections:

1. Connections with vibration isolation mounted air handling equipment.
2. Connections with fixed wall louvers for air intake and exhausts.
3. Where ductwork, 1.0 square foot and greater, changes directions in critical locations.

I. Flexible pipe connectors - install in piping systems at the following location:

1. Connections, 3/4" pipe size and larger, with vibration isolation mounted equipment.

3.03 INSTALLATION

A. General - except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary protection against overloading during installation.

B. Anchor and attach units to substrate and equipment as required for secure operation and to prevent displacement by normal forces, and as indicated.

C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

D. Locate isolation hangers as near overhead support structure as possible.

E. Weld riser isolator units in place as required to prevent displacement from loading and operations.

F. Bond flanges of flexible duct connectors to ducts and housings to provide airtight connections. Seal seams and penetrations to prevent air leakage.

G. Flexible pipe connectors - install on equipment side of shutoff valves, horizontally and parallel to equipment shafts wherever possible.

3.04 DEFLECTION MEASUREMENTS

A. Upon completion of vibration isolation work, prepare report showing measured equipment deflections for each major item of equipment as indicated.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230580 – MECHANICAL TESTING REQUIREMENTS

PART 1 – GENERAL

1.01 INCLUDED SYSTEMS AND EQUIPMENT

A. The following is a partial list of the equipment and system test requirements included in this section:

1. Air handler systems
2. Building management control system & energy management
3. Hydronic piping and HVAC Pumps
4. Exhaust fans
5. Indoor air climate control--misc. systems
6. Indoor air quality (IAQ)
7. Terminal unit
8. Test and balance (TAB) work
9. Air Conditioning Equipment

1.02 DESCRIPTION

A. This section specifies the functional testing requirements for Division 15 systems and equipment. From these requirements, the Commissioning Authority (CA) shall develop step-by-step procedures to be executed by the Subs or the Commissioning Authority. The general functional testing process, requirements and test method definitions are described in Section 01810 Commissioning. The test requirements for each piece of equipment or system contain the following:

1. The contractors responsible to execute the tests, under the direction of the CA.
2. A list of the integral components being tested.
3. Construction checklists associated with the components.
4. Functions and modes to be tested.
5. Required conditions of the test for each mode.
6. Special procedures.
7. Required methods of testing.
8. Required monitoring.
9. Acceptance criteria.
10. Sampling strategies allowed.

1.03 PREREQUISITES

A. The following applicable generic prerequisite checklist items are required to be listed on each written functional test form and be completed and checked off by CA prior to functional testing.

B. All related equipment has been started up and start-up reports and construction checklists submitted and approved ready for functional testing.

C. All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final set points and schedules with debugging, loop tuning and sensor calibrations completed.

1. Piping system flushing complete and required report approved.
2. Water treatment system complete and operational.
3. Vibration control report approved (if required).

4. Test and balance (TAB) complete and approved for the hydronic system.
5. All A/E punch list items for this equipment corrected. These functional test procedures reviewed and approved by installing contractor.
6. Safeties and operating ranges reviewed by the CA.
7. Test requirements and sequences of operation attached.
8. Schedules and set points attached.
9. False loading equipment, system and procedures ready.
10. Sufficient clearance around equipment for servicing.
11. Record of all values for pre-test set points changed to accommodate testing has been made and a check box provided to verify return to original values (control parameters, limits, delays, lockouts, schedules, etc.).
12. Other miscellaneous checks of the pre-functional checklist and start-up reports completed successfully.

1.04 MONITORING

A. Monitoring is a method of testing as a stand-alone method or to augment manual testing.

B. All points listed in the required monitoring section of the test requirements which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. At the option of the CA, some control system monitoring may be replaced with data logger monitoring. At the CA's request, the Temperature Controls Contractor shall trend up to 20% more points than listed herein at no extra charge.

C. Hard copies of monitored data must be in columnar format with time down the left column and at least 5 columns of point values on the same page.

D. Graphical output is desirable, and will be required for all output, if the system can produce it.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

The following Sample test procedures are representative of the level of detail required for this project. The Owner reserves the right to work with the Contractor to amend these data sheets as necessary at no extra cost to the Owner.

3.01 AIR HANDLER UNITS (AHU / RTU)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment as needed.

2. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested
Construction Checklist ID PC-_____
PC-_____

1. AHU/RTU and components (fans, coils, valves, ducts, VFD)
2. Heat recovery coil, humidifier or evaporative cooling sections.

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The

commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions/Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are an addition to and do not replace any testing requirements elsewhere in this Division.

Function / Mode	Test Method Manual, Monitoring, Either or Both[3]	Required Seasonal Test[1]
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks with which it is associated.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Mixed & supply air, & reset temperature control functions.	Both	
3. Economizer functions.	Both	Cooling
4. SF, and exhaust fan interlocks.	Either	
5. No CCV flow when there is HCV flow.	Both	
6. CCV & HCV modulation & positive shutoff (no leak-thru).	Manual	
7. Duct static pressure (SP) control.	Both	
8. Exhaust fan tracking and building SP.	Monitoring	
9. VFD (or inlet vanes) operation on SF and RF: modulation to minimum, control system PID, proportional band of speed vs controlling parameter, constancy of static pressure, verification of program settings, alarms, etc.	Both	[2]
10. Damper interlocks and correct modulation in all modes, including smoke and fire dampers.	Manual	
11. Temperature difference across HC & CC per specifications.	Manual	
12. Verification of minimum OSA control through varying VAV box positions.	Either	[2]
13. Heating and cooling coils freeze protection.	Manual	[2]
14. Branch duct control damper control.	Manual	
15. Night low limit, morning warm-up cycle.	Either	
16. Heat recovery operation.	Monitoring	
17. Verify TAB reported SF cfm with control system reading.	Manual	[2]
18. All alarms (low limits, high static, etc.).	Manual	
19. Heating and cooling coil capacity test, optional.	Manual	Design
20. Sensor and actuator calibration checks: on duct static pressure sensor on SAT, MAT, OSAT, OSA & RA damper and valve positions, SF cfm reading with TAB, and other random checks (EMS readout against hand-held calibrated instrument or observation must be within specified tolerances)	Manual	
21. Verify schedules and setpoints to be reasonable and appropriate		

[1]Cooling season, Heating season or Both. “Design” means within 5°of season design (ASHRAE 2 1/2%),

or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.
[2]Seasonal test not required if seasonal conditions can be adequately simulated.
[3]Refer to Special Procedures

E. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. Reduced Testing for Smaller Units. For standard application AHU's less than 15 tons, the following modifications to the testing requirements apply: 1) either Manual or Monitoring will satisfy the verification requirement--where both is listed, choose one. 2) Testing Modes 6, 8, 11, 13 and 16 is not required.

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each AHU being tested:					
RAT	5	5 days incl. weekend	Y	Y	1-3, 5
SAT	5	5 days incl. weekend	Y	Y	1-3, 5
CC LAT (optional)	5	5 days incl. weekend	Y	Y	1-3, 5
HC LAT (optional)	5	5 days incl. weekend	Y	Y	1-3, 5
MAT	5	5 days incl. weekend	Y	Y	1, 3
Indoor WB or enthalpy, if enthalpy economizer	5	5 days incl. weekend	Y	Y	1, 3
SF speed, if variable, else status	5	5 days incl. weekend	Y	Y	1, 5-9
RF speed, if variable, else status	5	5 days incl. weekend	Y	Y	1, 5-9
Duct SP	5	5 days incl. weekend	Y	Y	1, 7, 9
Building SP differential	5	5 days incl. weekend	Y	Y	8
OSAT	5	5 days incl. weekend	Y	Y	All
OSA-WB or enthalpy, if enthalpy economizer	5	5 days incl. weekend	Y	Y	1, 3
Indoor dry-bulb zones (expected to be most problematic)	5	5 days incl. weekend	Y	Y	All

Remarks:

CCV position (optional)
HCV position (optional)
SF cfm not required if not monitored
RF cfm not required if not monitored

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-21. For the conditions, sequences and modes tested, the AHU/RTU, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

2. AHU/RTU with supporting systems shall be able to maintain the SA temperature within 1.0F either side of the deadband of the current setpoint without excessive hunting.

3. AHU/RTU and controls shall control the duct static pressure so that it does not drift more than an amount equal to 10% of the setpoint value either side of the deadband without excessive hunting.

H. Sampling Strategy for Identical Units

1. All identical AHU's/RTU's over 15 tons shall not have any sampling--test all units. However, 25% of the units may have monitoring be the verification method for modes listed with Monitoring or Both as testing methods, with no less than three units being fully tested per the above requirements.

2. All identical AHU's/RTU's equal to or less than 15 tons shall be sampled: Randomly test at least 50% of each group of identical equipment (the 1st sample) per the above tests. In no case test less than three units in each group. If 20% of the units in the first sample fail the functional performance tests, test another the remaining 50%, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

3. All units not included in the sampling testing and monitoring shall be fully monitored for the monitoring modes listed above in the monitoring section.

3.02 BOILER SYSTEM (HEATING WATER)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls, as needed.

2. HVAC mechanical contractor or vendor: assist in testing sequences.

3. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested

	Construction Checklist ID
1. Boiler	PC-____
2. Primary HW supply pumps	PC-____
3. Heating water piping system	PC-____
4. Secondary HW supply pumps	PC-____
5. VFD on secondary pumps	PC-____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements.

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

Function / Mode	Test Method Manual, Monitoring, Either or Both	Required Seasonal Test[1]
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unnoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Primary Side. Lead/lag staging of boilers, optimization, capacity modulation, and primary HW supply pumps.	Both	Heating
3. Secondary Side. Secondary WH supply pump staging, bypass valve operation, if no VFD and HWT reset. VFD operation: modulation to minimum, control system PID, proportional band of speed vs controlling parameter, verification of program settings,, alarms, etc.	Both	Heating
4. Check all alarms and safeties (high and low pressure and temperature, etc.), PRV and flow switch functions	Manual	
5. Test each possible lead boiler as lead boiler, and each pump as lead pump. Test pump lockouts.	Manual	
6. Flue gas analysis verification, optional	Manual	
7. Efficiency and capacity tests, optional	Manual	Heating
8. Verify boiler inlet/outlet pressures with startup report and manufacturer's recommendations	Manual	
9. Sensor and actuator calibration checks on: HWST, HWRT, pressure sensor controlling pump speed, mixing valve and other random checks (EMS readout against hand-held calibrated instrument must be within 0.5°F for temps. or within a tolerance equal to 10% of the pressure setpoint, with a test gage)	Manual	
10. Constancy of differential pressure (pump control parameter)	Monitoring	Heating
11. Verify schedules and setpoints to be reasonable and appropriate		

[1]Cooling season, Heating season or Both. "Design" means within 5°of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

E. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. False load boiler, if necessary.

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each boiler and pump:					
Boiler current or status	5	5 days incl. weekend	Y	Y	1-3
HWST	5	5 days incl. weekend	Y	Y	1, 3
HWRT	5	5 days incl. weekend	Y	Y	1, 3
OSAT-DB	5	5 days incl. weekend	Y	Y	1-3
HWS primary pump current or status	5	5 days incl. weekend	Y	Y	1, 2
HWS secondary pump speed, if variable	5	5 days incl. weekend	Y	Y	1, 3
HWS secondary pump flow rate, if in EMS	5	5 days incl. weekend	Y	Y	1, 3
HWS secondary pump speed controlling parameter value	5	5 days incl. weekend	Y	Y	1, 3, 10

Remarks:

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-11. For the conditions, sequences and modes tested, the boilers, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

2. Boiler shall maintain the supply water set point to within +/- 1.0F of set point dead band without excessive hunting.

3. 9.-10. Pumping system and controls shall maintain the current desired pressure set point to within an amount equal to 10% of the set point value either side of the dead band without excessive hunting.

H. Sampling Strategy for Identical Units

1. No sampling, test all.

3.03 BUILDING AUTOMATION SYSTEM (BAS)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment.

2. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested

	Construction Checklist ID
1. Building Automation System	PC-_____

2. All construction checklists of controlled equipment

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The

commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. A significant part of the BAS functional testing requirements is the successful completion of the functional tests of equipment the BAS controls or interlocks with. Uncompleted equipment functional tests or outstanding deficiencies in those tests lend the required BAS functional testing incomplete.

E. Integral or stand-alone controls are functionally tested with the equipment they are attached to, including any interlocks with other equipment or systems and thus are not covered under the BAS testing requirements, except for any integrated functions or interlocks listed below.

F. In addition to the controlled equipment testing, the following tests are required for the BAS, where features have been specified. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in the specifications.

	Function / Mode	Test Method Manual (demonstration), Monitoring, Either or Both
MISC. FUNCTIONS		
1.	All specified functions and features are set up, debugged and fully operable	Verbal discussion of features
2.	Power failure and battery backup and power-up restart functions	Demonstration
3.	Specified trending and graphing features demonstration	See equipment trends
4.	Global commands features	Demonstration
5.	Security and access codes	Demonstration
6.	Occupant over-rides (manual, telephone, key, keypad, etc.)	Demonstration
7.	O&M schedules and alarms	Demonstration
8.	Scheduling features fully functional and setup, including holidays	Observation in terminal screens or printouts
9.	Date and time setting in central computer and verify field panels read the same time	Demonstration
10.	Included features not specified to be setup are installed (list)	Demonstration
11.	Occupancy sensors and controls	Demonstration
12.	Demonstrate functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad	Demonstration of 100% of panels and 10% of ports
13.	All graphic screens and value readouts completed	Demonstration
14.	Setpoint changing features and functions	Done during equipment testing
15.	Communications to remote sites	Demonstration
16.	Sensor calibrations	Sampled during equipment tests
17.	“After hours” use tracking and billing	
18.	Final as-builts or redlines (per spec) control drawings, final points list, program code, setpoints, schedules, warranties, etc. per specs, submitted for O&Ms.	Observation
19.	Verify that points that are monitored only, having no control function, are checked for proper reporting to BAS.	Observation

	Function / Mode	Test Method Manual (demonstration), Monitoring, Either or Both
INTEGRATED TESTS		
20.	Fire alarm interlocks and response	Demonstration
21.	Duty cycling (if specified)	Monitoring
22.	Demand limiting (including over-ride of limiting)	Monitoring
23.	Sequential staging ON of equipment	Either
24.	Optimum start-stop functions	Monitoring
25.	All control strategies and sequences not tested during controlled equipment testing	Either
26.	Other integrated tests specified in the contract documents	
27.	Security system interlocks	Demonstration
28.	Fire protection and suppression systems	Demonstration

G. Special Procedures (other equipment to test with, etc.; reference to function ID) None

H. Additional Required Monitoring

1. Besides the trending and monitoring required with the functional testing of equipment, all points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
Misc. equipment current or status for duty cycling and demand limiting	5	5 days incl. weekend	Y	Y	21-22
Equipment or building kW or current for demand limiting	5	5 days incl. weekend	Y	Y	21-22
Optimum start/stop equip.	5	5 days incl. weekend	Y	Y	24

Remarks:

I. Acceptance Criteria (referenced by function or mode ID)

1. For the conditions, sequences and modes tested, the BAS, integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

J. Sampling Strategy for Identical Units

1. Sample 10% of the field panels for procedure 9, and 10% of the local ports for procedure 12. If 10% fail, test another 10%. If 10% of those fail, test all remaining units at the contractor's expense.

3.04 EXHAUST FANS

A. The testing requirements apply to the following fans (check all that apply): central restroom, mechanical room.

B. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment, if BAS controlled.

2. CA: to witness, direct and document testing.

C. Integral Components or Related Equipment Being Tested

	Construction Checklist ID
1. Exhaust fans	PC-_____

D. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

E. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

Function / Mode	Test Method Manual, Monitoring, Either or Both[1]	Required Seasonal Test
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unnoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Verify schedules and setpoints to be reasonable and appropriate		
3. Function at fire alarm (off, depressurization, etc.)	Manual	
4. Interlocks to building pressurization control	Manual	
5. Speed controls	Either	
6. Check TAB report record of sound power level tests and space pressures and compare to specifications	Review	
7. Sensor calibration checks on any controlling temperature or pressure sensor	Manual	

[1]Refer to Special Procedures

F. Special Procedures (other equipment to test with, etc.; reference to function ID) None

G. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using dataloggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each fan:					
Do be determined					

Remarks:

H. Acceptance Criteria (referenced by function or mode ID)

1. 1-6. For the conditions, sequences and modes tested, the fans, integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

I. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.

1. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

3.05 INDOOR AIR CLIMATE CONTROL--MISC. SYSTEMS

A. At least 10% of all space zones shall be verified to be maintaining proper climate control. Specific test requirements for this may have been identified elsewhere in this specification (e.g., under terminal units). For all areas not specifically specified, otherwise, the following tests shall be conducted.

B. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls and provide trend logs

2. CA: to witness, direct and document testing.

C. Integral Components or Related Equipment Being Tested

1. Cooling plant (entire system)
2. Heating plant (entire system)
3. Air, water distribution system
4. Control system

D. Prerequisites All listed systems in Part B, above, shall have had successful functional tests completed prior to this test.

E. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

This is a performance test to verify that the HVAC systems can provide and maintain the temperature and relative humidity levels specified, during normal and extreme weather and occupancy conditions. The test consists of monitoring, via trend logs, of various points during the cooling season when temperatures reach to within 5°F of season design (ASHRAE 2 1/2%).

F. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. Building should be normally occupied during the test.

G. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
Space temperature control:					
Space temperature	5	5 days incl. weekend	Y	Y	1-3
OSAT-DB	5	5 days incl. weekend	Y	Y	1-3

Remarks:

H. Acceptance Criteria (referenced by function or mode ID)

1. Space temperature during occupied modes shall average within +/- 1°F of set point and always remain within 1°F of the ends of the dead band without excessive hunting of either the applicable damper or coil valve, or complaints of drafts or stuffiness from occupants.

I. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.

1. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

3.06 SERVICE HOT WATER SYSTEM

A. Parties Responsible to Execute Functional Test

1. CA: perform and document testing.

B. Integral Components or Related Equipment Being Tested

Construction Checklist ID

1. Hot water heaters (heaters, mixing valves) PC-_____

2. Recirculating pumps PC-_____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The

commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

Function / Mode	Test Method Manual, Monitoring, Either or Both	Required Seasonal Test
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unnoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Verify schedules and setpoints to be reasonable and appropriate		
3. Unoccupied pump operation	Either	
4. Mixing valve operation and temperature control	Either	
5. Sensor calibration checks on hot water temperature	Manual	

E. Special Procedures (other equipment to test with, etc.; reference to function ID) None

F. Required Monitoring None

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-6. For the conditions, sequences and modes tested, the fan's integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

H. Sampling Strategy for Identical Units

1. No sampling. Test all units.

3.07 TERMINAL UNITS

(This applies to standard applications, critical applications will have additional tests and a higher fraction tested.)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment.

B. Integral Components or Related Equipment Being Tested

	Construction Checklist ID
1. Terminal unit (TU)	PC-_____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The

commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

Function / Mode	Test Method Manual, Monitoring, Either or Both[3]	Required Seasonal Test[1]
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, warmup, shutdown, unnoccupied & manual modes and power failure and restoration. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with, including all damper, valve and fan functions.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Sensor activator calibration checks on: SAT, MAT, zone air temperature damper position and other random checks (EMS readout against visual or hand-held calibrated instrument must be within 0.5°F for temps. or within a tolerance equal to 10% of static pressure setpoint, with an inclined manometer)	Manual	
3. Device and actuator calibration and stroke checks for heating coil valve and non-DDC dampers	Manual	
4. For the TU's tested, check the construction checklist items.	Observation	
5. Verify control parameters and setpoints to be reasonable and appropriate by reviewing the full program of 5% of all the TU's with each other for consistency. Verify the max. and min. cfm setpoints of all tested TU's against the control drawing and TAB values. Verify other TU programming parameters such as K-factors, deadbands, setpoints, stroke times, etc.	Observation	
6. Verify no CCV flow when there is HCV flow	Either	
7. Verify no hunting or significant overshoot by damper or valves.	Either	
8. Verify by measurement, CCV & HCV positive shutoff (no leak-thru)	Manual	
9. Verification of minimum OSA control through varying VAV box positions, if applicable	Either	[2]
10. All alarms (fan status, low limits, high static, etc.)	Manual	
11. Verify that TU is maintaining space setpoint temperatures	Monitoring	Both Design
12. Verify airflows and pressures (this random test is part of the TAB test)	--	

NOTES:
[1]Cooling season, Heating season or Both. "Design" means within 5°F of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.
[2]Seasonal test not required if seasonal conditions can be adequately simulated.
[3]Refer to Special Procedures

E. Special Procedures (other equipment to test with, etc.; reference to function ID) None

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using dataloggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each zone thermostat and space sensor and other critical areas, monitor:					
Space temperature	10	3 weekdays, summer design	Y	Y	11
Space temperature	10	3 weekdays, winter design	Y	Y	11
Space temperature	2	8 hours, occupied	Y	Y	7
Heating coil valve	2	8 hours, occupied	Y	Y	7
Damper position or cfm	2	8 hours, occupied	Y	Y	7

Remarks:

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-11. For the conditions, sequences and modes tested, the TU, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

2. 10. Space temperature during occupied modes shall average within +/- 1°F of setpoint and always remain within 1°F of the ends of the deadband without excessive hunting of either the damper or coil valve, or complaints of drafts or stuffiness from occupants.

H. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.

1. Testing. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

2. Monitoring. Ten percent of the total number of zones in the building, chosen by the Owner, shall be monitored. Within this 10%, shall be included a distribution of all air handlers, zones expected to have the greatest heating and cooling demand, perimeter and core zones and zones identified from the commissioning process that have exhibited potential problems.

3.08 TEST AND BALANCE WORK (TAB)

A. Parties Responsible to Execute Functional Test

1. TAB contractor: perform checks using test instruments.

2. Temperature Controls Contractor: operate the controls to activate the equipment.

3. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested

	Construction Checklist ID
1. TAB water-side	PC-_____
2. TAB air-side	PC-_____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Purpose. The purpose of this test is to spot check the TAB work to verify that it was done in accordance with the contract documents and acceptable practice and that the TAB report is accurate.

E. The following tests and checks will be conducted. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

	Test or Check	Test Method	Required Seasonal Test[3]
	A random sample of up to 25 % the TAB report data shall be selected for verification (air velocity, air or water flow rate, pressure differential, electrical or sound measurement, etc.). The original TAB contractor will execute the checks, witnessed by the commissioning authority. The TAB contractor will use the same test instruments as used in the original TAB work. A failure[1] of more than 10% of the selected items of a given system[2] shall result in the failure of acceptance of the system TAB report and the TAB contractor shall be responsible to rebalance the system, provide a new system TAB report and repeat random verifications of the new TAB report. The testing will include the verification of minimum outdoor air intake flows at minimum, maximum and intermediate total airflow rates for 100% of the air handlers. Other selected data to be verified will be made known upon day of testing.	Demonstration	
2.	Verify that final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked by the TAB Contractor.	Demonstration	

3.	Verification that the air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all TUs taking off downstream of the static pressure sensor, the TU on the critical leg has its damper 90% or more open.	Demonstration	
4.	Verification that the water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90% or more open.	Demonstration	

[1]Failure of an item is defined as follows:

For air flow of supply and return: a deviation of more than 10% of instrument reading

For minimum outside air flow: 20% of instrument reading (30% for reading at intermediate supply flow for inlet vane or VFD OSA compensation system using linear proportional control)

For temperatures: a deviation of more than 1°F

For air and water pressures: a deviation of more than 10% of full scale of test instrument reading

For sound pressures: a deviation of more than 3 decibels. (Variations in background noise must be considered)

[2]Examples of a "system" are: the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system. Systems can be defined smaller if inaccuracies in TAB work within the smaller defined system will have little or no impact on connected systems.

[3]Cooling season, Heating season or Both. "Design" means within 5°of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

F. Special Procedures (other equipment to test with, etc.; reference to function ID) None

G. Required Monitoring None

H. Acceptance Criteria (referenced by function or mode ID)

1. Provided in footnote to test table above.

I. Sampling Strategy for Identical Units

1. Described in test table above.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230593 – HVAC TESTING, ADJUSTING AND BALANCING

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Scope: Extent of HVAC testing, adjusting and balancing work required by this Section is indicated on the drawings, in schedules, and by the requirements of this Section.

B. Testing, Adjusting and Balancing (TAB) contractor to meet or exceed all uniform code testing requirements. (e.g. ASHRAE, ASME, IMC, Etc.)

C. Systems: Testing, adjusting and balancing specified in this Section includes the following systems:

1. Air systems including supply, return and exhaust.
2. Hydronic systems including heating, chilled water.

D. Related Sections: Refer to other Division 23 sections for:

1. Fans
2. Air Terminal Units
3. Pumps
4. Hydronic Piping Systems
5. Ductwork
6. Boilers
7. Chillers and Cooling Towers

1.02 QUALITY ASSURANCE

A. Agency Qualifications

1. The qualifications of the TAB contracting firms shall be submitted, within 30 days of notice to proceed. Recent projects shall be listed and described for the company. Names and telephone numbers of the project contractors and facility managers will be provided.

2. The Owner must approve in writing the qualifications of both the company and the lead technician.

3. Qualifications of TAB Firm Personnel:

a. A minimum of one professional engineer with current registration is required to be in the permanent employment of the firm for supervision and direction in the work performed. This engineer shall be totally responsible for developing job site data as required for test procedures.

b. All personnel used on job site shall be either professional engineer or technicians, who shall have been permanent, full-time employees of firm for a minimum of six (6) months prior to start of work for that specified project.

c. The qualifications of the TAB lead site technician who will remain on site during all TAB work, within 30 days of notice to proceed. Recent projects shall be listed and described for the company. Names and telephone numbers of the project contractors and facility managers will be provided.

d. The Owner must approve in writing the qualifications of both the company and the lead technician.

B. Tester's Qualifications: A specialist certified by the National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) with at least 3 years of experience in those testing, adjusting and balancing requirements similar to those required for this project, who is not the installer of the system to be tested and is otherwise independent of the project.

C. Codes and Standards: Provide testing, adjusting and balancing conforming to American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), American National Standards Institute (ANSI), and either NEBB or AABC the following:

1. American National Standards Institute (ANSI): Comply with the following:

a. S1.4Specification For Sound Level Meters
b. S1.11Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters

2. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): Comply with ASHRAE recommendations pertaining to measurements, instruments, and testing, adjusting, and balancing.

3. NEBB or AABC: Comply with NEBB'S "Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems" or comply with AABC MN-1 "National Standards," as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus.

D. Calibration of Testing Instruments: All measurement instruments used for testing, adjusting, balancing, and commissioning shall be calibrated. The time between the most recent calibration data and the final test report date shall not be over 1 year.

1.03 SUBMITTALS

A. Test Reports: Provide certified test reports, signed by the test and balance supervisor who performed the work. The final reports shall include identification and types of instruments used, and their most recent calibration date and calibration date.

B. Standards: Deliver a copy of either NEBB or AABC standards for testing and balancing work associated with the project. This document shall serve as specific guidance to balancers as to minimum requirements.

C. Maintenance Data: Include, in maintenance manuals, copies of balance test reports and identification of instruments.

D. Qualifications: Submit the individual qualifications of all persons responsible for supervising and performing the actual work.

1.04 AGENDA

A. Agenda: A preliminary report and agenda shall be submitted and approved prior to the start of testing and balancing work.

1. Review Drawings and Specifications prior to installation of any of the affected systems, and submit a report indicating any deficiencies in the systems that would preclude the proper adjusting, balancing, and testing of the systems.

2. The agenda shall include a general description of each air and water system with its associated equipment and operation cycles for heating, intermediate, and cooling.

3. The agenda shall include a list of all air and water flow and air terminal measurements to be performed.

4. The agenda shall incorporate the proposed selection points for sound measurements, including typical spaces as well as sound sensitive areas.

5. The agenda shall also include specific test procedures and parameters for determining specified quantities (e.g. flow, drafts, sound levels) from the actual field measurements to establish compliance with contract requirements. Samples of forms showing application of procedures and calculations to typical systems shall be submitted.

6. Specific test procedures for measuring air quantities at terminals shall specify type of instrument to be used, method of instrument application (by sketch) and factors for:

    a. Air terminal configuration.
    b. Flow direction (supply or exhaust).
    c. Velocity corrections.
    d. Effective area applicable to each size and type of air terminal.
    e. Density corrections.

7. The agenda shall include identification and types of measurement instruments to be used, and their most recent calibration date and calibration date.

1.05 JOB CONDITIONS

A. General: Do not proceed with testing, adjusting and balancing work until the following conditions have been met.

1. Work has been completed and is operable. Ensure that there is no latent residual work yet to be completed on the tested equipment.

2. Work scheduled for testing, adjusting and balancing is clean and free from debris, dirt and discarded building materials.

3. All architectural openings (doors, windows, and other openings) which may affect the operation of the system to be tested, adjusted, and balanced shall at their normal states.

4. All related mechanical systems which may affect the operation of the system to be tested, adjusted, and balanced shall be at their normal operating conditions. Coordinate tests with Controls Contractor.

5. Air handling unit filters are not "loaded"; Mechanical Contractor shall replace, if required, prior to balancing.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

A. Material: Seal, patch and repair ductwork, piping and equipment drilled or cut for testing purposes.

1. Plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2. Piping shall be capped with materials the same as the piping system.

3. Insulation shall be neatly hemmed with metal or plastic.

2.02 TEST INSTRUMENTS

A. Standards: Utilize instruments and equipment of type, precision, and capacity as recommended in the following standards:

1. NEBB "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

2. AABC Manual MN-1, "AABC National Standards".

B. Test Instruments: All instruments used for measurements shall be accurate and calibration histories for each instrument shall be available for examination. Each test instrument shall be calibrated by an approved laboratory or by the manufacturer. Owner's representative has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.

C. Additional Instruments: Permanently installed measuring instruments, such as temperature and pressure gauges, shall be checked against transfer standard instruments. Any instrument which does not meet specification requirement shall be replaced or recalibrated.

D. Cone Instruments: Employ manufactured enclosure type cones, capable of air volume direct readings, for all diffuser air flow measurements. The readout meters shall meet calibration requirements.

PART 3 - EXECUTION

3.01 PROCEDURES AND INSTRUMENTS, GENERAL

A. Requirements: All systems and components thereof shall be adjusted to perform as required by drawings and specifications.

B. Test Duration: Operating tests of heating and cooling coils, fans, and other equipment shall be of not less than four hours duration after stabilized operating conditions have been established. Capacities shall be based on temperatures and air and water quantities measured during such tests.

C. Instrumentation: Method of application of instrumentation shall be in accordance with the approved agenda.

1. All instruments shall be applied in accordance with the manufacturer's certified instructions.

2. All labor, instruments, and appliances required shall be furnished by the balancer. Permanently installed instruments used for the tests (e.g., flow meters and Btu meters) shall not be installed until the entire system has been cleaned and ready for operation.

3.02 AIR SYSTEM PROCEDURES

A. Adjustments: Adjust all air handling systems to provide approximate design air quantity to or through, each component, and to maintain stable and comfortable interior temperatures, free of drafts or stagnant conditions. Adjusting and balancing of all systems shall be conducted during periods of the year approximating maximum seasonal operation. Verify operating parameters prior to start of balancing. Laboratory doors shall be closed and fume hood sashes full open, and all

other ancillary systems in simultaneous operation. Coordinate with automatic control system operation.

B. Balance: Flow adjusting (volume control) devices shall be used to balance air quantities (i.e., proportion flow between various terminals comprising system) to the extent that their adjustments do not create objectionable air motion or sound (i.e., in excess of specified limits).

1. Balancing between runs (submains, branch mains, and branches) generally shall be accomplished by flow regulating devices at, or in, the divided-flow fitting.

2. Restriction imposed by flow regulating devices in or at terminals shall be minimal. Final measurements of air quality shall be made after the air terminal has been adjusted to provide the optimum air patterns of diffusion.

C. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds or axial-flow fan wheel blade pitch. Damper restriction of a system's total flow may be used only for systems with direct-connected fans (without adjustable pitch blades), provided system pressure is less than 1/2-inch W.G. and sound level criteria is met.

D. Air Measurement: Where air quantity measuring devices are specified in other sections such systems shall be used as a cross-check of portable measuring equipment.

1. Except as specifically indicated herein, pitot tube traverses shall be made of each duct to measure air flow therein. Pitot tubes, associated instruments, traverses, and techniques shall conform to the ASHRAE "Handbook Fundamentals Inch Pound Edition."

2. For ducts serving modular office areas with movable partitions, which are subject to change, pitot tube traverses may be omitted provided the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of pitot tube traverses, air flow in the duct shall be determined by totalling volume of individual terminals served, measured as described herein.

3. Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.

E. Test Holes: Test holes shall be in a straight duct, as far as possible downstream from elbows, bends, take-offs, and other turbulence generating devices, to optimize reliability of flow measurements.

F. Air Terminal Balancing: Generally, measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing. Measurement of air quantities at each type of air terminal (inlet and outlet) shall be determined by the method approved for the balancing agenda.

G. Air Motion: Air motion and distribution shall be as specified and indicated on Drawings.

3.03 WATER SYSTEM PROCEDURES

A. Adjustment: All heating, cooling and condensing water systems shall be adjusted to provide required quantity to or through each component. Verify operating parameters prior to start of balancing.

B. Metering: Water quantities and pressures shall be measured with calibrated meters.

1. Venturi tubes, orifices, or other metering fittings and pressure gauges shall be used to measure water flow rates and balance systems. Systems shall be adjusted to provide the approved

pressure drops through the heat transfer equipment (coils [except room units], converters, etc.) prior to the capacity testing.

2. Where flow metering fittings are not installed, in air/water type heat transfer equipment, flow balance shall be determined by measuring the air side energy differential across the heat transfer equipment. Measurement of water temperature differential shall be performed with the air system, adjusted as described herein, in operation.

C. Automatic Controls: Automatic control valves shall be positioned for full flow through the heat transfer equipment of the system during tests.

D. Flow: Flow through bypass circuits at three-way valves shall be adjusted to equal that through the supply circuit, when the valve is in the bypass position.

E. Distribution: Adjustment of distribution shall be effected by means of balancing devices (cocks, valves, and fittings) and automatic flow control valves as provided; service valves shall not be used.

1. Where automatic flow control valves are utilized in lieu of Venturi tubes, only pressure differential need be recorded, provided that the pressure is at least the minimum applicable to the tag rating.

F. Special Procedures: Where available pump capacity (as designed) is less than total flow requirements of individual heat transfer units of system served, full flow may be simulated by the temporary restriction of flow to portions of the system; specific procedures shall be delineated in the agenda.

3.04 HEAT EXCHANGER CAPACITY VERIFICATION

A. Air coil capacities shall be verified from air side measurement data. Capacities of coils shall be the difference of the energy carried by the air between the up stream and down stream of the coils.

B. The measured air flow rate for the fan may be used for air coil capacity calculations providing no ducted bypassing of coil is occurring.

C. Capacity verifications shall be performed after air and water systems have been balanced. Heat exchangers using steam as the exchange medium shall have the steam measured and adjusted to the specified pressure.

D. False load shall be applied if the upstream air or water does not meet the specified conditions at the time of test.

3.05 REPORTS

A. Submittals: Three copies of the reports described herein, covering air and water system performance, air motion (fpm), and sound pressure levels, shall be submitted prior to final tests and inspection.

B. Instrument Records: Types, serial numbers, and dates of calibration of all instruments shall be included.

C. Reports: Reports shall conspicuously identify items not conforming to contract requirements, or obvious malfunction and deficiencies.

3.06 AIR SYSTEM DATA

A. Report: The report shall include for each air handling system the data listed below.

1. Equipment (Fan or Factory Fabricated Station Unit):

    a. Installation data

        1) Manufacturer and model
        2) Size
        3) Arrangement, discharge and class
        4) Motor hp, voltage, phase, cycles, and full load amps
        5) Location and local identification data

    b. Design data

        1) Data listed in schedules on drawings and specifications.

    c. Fan recorded (test) data

        1) cfm
        2) Static pressure
        3) rpm
        4) Motor operating amps motor operating bhp

2. Duct Systems:

    a. Duct air quantities (maximum and minimum) - main, submains, branches, outdoor (outside) air, total air, and exhaust

        1) Duct size(s)
        2) Number of Pitot tube (pressure measurements)
        3) Sum of velocity measurements (Note: Do not add pressure measurements)
        4) Average velocity
        5) Recorded (test) cfm design cfm

    b. Individual air terminals

        1) Terminal identification supply or exhaust, location and number designation
        2) Type size, manufacturer and catalog identification applicable factor for application, velocity, area, etc., and designated area
        3) Design and recorded velocities- fpm (state "core," "inlet," etc., as applicable)
        4) Design and recorded quantities -cfm deflector vane or diffusion cone settings

3.07 WATER SYSTEM DATA

A. Report: The certified report for each water system shall include the data listed below.

1. Pumps:

    a. Installation data

        1) Manufacturer and model
        2) Size
        3) Type drive
        4) Motor hp, voltage, phase, and full load amps

    b. Design data

        1) gpm

2) Head
3) rpm, bhp, and amps

c. Recorded data

1) Discharge pressures (full-flow and no-flow)
2) Suction pressures (full-flow and no-flow) operating head
3) Operating gpm (from pump curves if metering is not provided) no-load amps (where possible)
4) Full-flow amps
5) No-flow amps

2. Air Heating and Cooling Equipment:

a. Design data

1) Load in Btu or MBh
2) gpm
3) Entering and leaving water temperature
4) Entering and leaving air conditions (DB and WB)

b. Recorded data

1) Type of equipment and identification (location or number designation)
2) Entering and leaving air conditions (DB and WB)
3) Entering and leaving water temperatures

3. Water Chilling Units:

a. Installation data

1) Manufacturer and model
2) Motor hp, voltage, cycles, phase, and full load amps
3) Part load amperes
4) gpm - chiller and condenser
5) Water pressure drop - chiller and condenser
6) Entering and leaving water temperature - chiller and condenser

b. Recorded data (chiller and condenser)

1) gpm
2) Water pressure drop
3) Entering and leaving water temperature
4) Amperes

3.08 FINAL COMMISSIONING TESTS, INSPECTIONS AND ACCEPTANCE

A. Scope: Test shall be made to demonstrate that capacities and performance of air and water systems comply with contract requirements.

1. At the time of final inspection, recheck random selection of data (water and air quantities, air motion, and sound levels) recorded in the balancing report. All laboratories shall be rechecked for satisfactory air flow and motion on vicinity of and through hoods.

2. Points and areas for recheck shall be selected by the Owner's Representative.

3. Measurement and test procedures shall be the same as approved for work forming basis of certified report.

4. Selections for recheck (specific plus random), in general, will not exceed 25 percent of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.

B. Retests: If random tests elicit a measured flow deviation of 10 percent or more from, or a sound level of 2 db or more greater than, that recorded in the report listings, as 10 percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made, all at no additional cost.

C. Marking of Settings: Following final acceptance of balance reports, the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230680 – FIRE STOPPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested fire stop systems shall be used in specific locations as follows:

1. Penetrations for the passage of ductwork, cable, cable tray, conduit, piping, electrical bus ways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. Safing slot gaps between edge of floor slabs and curtain walls.

C. Openings between structurally separate sections of wall or floors.

D. Gaps between the top of walls and ceilings or roof assemblies.

E. Expansion joints in walls and floors.

F. Openings and penetrations in fire-rated partitions or walls containing fire doors.

G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 033000 – Cast-In-Place Concrete Work
2. Section 042000 – Unit Masonry
3. Section 079200 – Joint Sealants
4. Section 092300 – Gypsum Plaster
5. Section 092900 – Gypsum Wall Board
6. Section 230300 – Mechanical Basic Materials and Methods
7. Section 230700 – HVAC Insulation

1.05 REFERENCES

A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Fire stop Devices (XHJI)
b. Fire Resistance Ratings (BXUV)
c. Through-Penetration Fire stop Systems (XHEZ)
d. Fill, Voids, or Cavity Material (XHHW)
e. Forming Materials (XHKU)

2. Alternate “Omega Point Laboratories Directory” (updated annually)

C. Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems” (June 2024.)

D. Test Requirements: ASTM E 1966-01, “Standard test method for Fire Resistive Joint Systems”

E. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.

H. All major building codes: ICBO, SBCCI, BOCA, and the Building Code of New York State.

I. NFPA 101 - Life Safety Code

J. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (Latest Edition varies (2009 – 2018), and may be amended from time to time).

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 13300.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma (or equal) 800-879-8000

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
   a. Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.

2. Hilti CP 681 Tub Box Kit for use with tub installations.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Firestop Sealant
5. Hilti CP 601s Elastomeric Firestop Sealant

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
2. Hilti CP 606 Flexible Firestop Sealant
3. Hilti FS-ONE Intumescent Firestop Sealant

E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti CP 672 Speed Spray
2. Hilti CP 601s Elastomeric Firestop Sealant
3. Hilti CP 606 Flexible Firestop Sealant
4. Hilti CP 604 Self-leveling Firestop Sealant

F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.

1. Hilti CP 677 Speed Plugs
2. Hilti CP 767 Speed Strips

G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Fire stop Sealant
2. Hilti CP 618 Fire stop Putty Stick
3. Hilti CP 620 Fire Foam
4. Hilti CP 601s Elastomeric Fire stop Sealant
5. Hilti CP 606 Flexible Fire stop Sealant

I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Fire stop Putty Stick

J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Fire stop Putty Pad

K. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 642 Fire stop Collar
2. Hilti CP 643 Fire stop Collar
3. Hilti CP 645 Wrap Strips

L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:

1. Hilti CP 637 Trowelable Fire stop Compound
2. Hilti FS 657 FIRE BLOCK
3. Hilti CP 620 Fire Foam

M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK

N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:

1. Hilti CP 672 Speed Spray
2. Hilti CP 601s Elastomeric Fire stop Sealant
3. Hilti CP 606 Flexible Fire stop Sealant
4. Hilti CP 604 Self-Leveling Fire stop Sealant

O. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

P. Provide a fire stop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.

3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate location and proper selection of cast-in-place Fire stop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place fire stop devices without interferences.

3.03 INSTALLATION

A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL fire stop systems that might hamper the performance of fire dampers as it pertains to duct work.

3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230700 – HVAC INSULATION

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Duct Insulation.

B. Pipe Insulation.

C. Equipment and Specialties Insulation.

D. Acoustical Wrap.

1.02 RELATED WORK

A. Division 23 – Mechanical, General

B. Division 23 – Hangers and Supports

C. Division 23 – Sleeves and Seals

D. Division 23 – Pumps

E. Division 23 – Refrigerant Piping System

F. Division 23 – Ductwork

1.03 DEFINITIONS

A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.

B. Run-out: Piping not more than 12 feet long that runs to an individual unit.

C. Subject to Damage: Items installed exposed less than 8 feet above the walking surface (i.e., floor platform, roof, grade, etc.) adjacent to the item.

1.04 QUALITY ASSURANCE

A. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E 84, NFPA 255, and UL 723.

1.05 SUBMITTALS

A. All submittals shall comply with Section 230000.

B. Provide product data on all insulation materials to be used. Indicate thickness to be used.

1.06 GENERAL REQUIREMENTS

A. Code Compliance: Contractor shall insulate all systems with the materials and thicknesses as required by code, but in no case shall the insulation be less than that specified herein. In some cases the specified insulation exceeds code, and shall be provided as specified. Not all systems

requiring insulation by code are specified but shall be provided with insulation where required by code.

B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems (except ductwork). Inserts at hangers are specified in Section 230300 and are considered as part of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hanger/supports. See Section 230300.

C. All adhesives, sealants, mastics and similar materials shall be low-VOC type and comply with Section 230000 Low-VOC requirements.

1.07 REFERENCES

A. ASTM A 653: Standard Specification For Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM C 547: Standard Specification for Mineral Fiber Pipe Insulation.

D. ASTM C 1136: Standard Specifications for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

E. ASTM C 1290: Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.

F. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

G. NCIIS: National Commercial & Industrial Insulation Standards, published by Midwest Insulation Contractors Association, 5th Edition.

H. NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.

I. UL 723: Tests For Surface Burning of Building Materials.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 230000.

B. Insulation: Johns Manville, Armacell, Owens-Corning, Knauf, Pittsburgh Corning, GLT, Halstead, Thermal Pipe Systems.

C. Accessories: Johns Manville, Armacell, Owens-Corning, Knauf, Pittsburgh Corning, GLT, Halstead, Duro Dyne, Gustin Bacon, Childers, RPR, Tee Cee, JPS, Buckaroos.

D. Acoustical Wrap: Kinetics Noise Control.

E. Fire Protection Duct Wrap: 3M.

2.02 DUCT INSULATION

A. Flexible Glass Fiber:

B. Material: Inorganic glass fibers, bonded with a thermosetting resin.

C. Jacket: All-purpose, factory-applied, laminated glass-fiber- reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

D. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

2. Density: 3 pcf average maximum.

E. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets. (maximum 25% compression installed)

1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

F. Adhesive: Produced under the UL Classification and follow-up service.

1. Type: Non-flammable, water-based.
2. Service Temperature Range: Minus 20 to 180 deg F (Minus 29 to 82 deg C).

G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.03 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, pre-sized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches
2. Cloth Standard: MIL-C-20079H, Type I.
3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304, 0.020 inch thick.
2. Aluminum: 0.0070 inch thick.

C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.

D. Corner Angles: 28-gauge (0.3 mm), 1 inch by 1 inch (25 mm by 25 mm) aluminum, adhered to 2 inches by 2 inches (51 mm by 51 mm) kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.04 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.
2. Temperature Range: Minus 20 to 180 deg F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum.
2. Temperature Range: Minus 50 to 250 deg F.
3. Cooler: Aluminum.

C. Duct Insulation installed R values:

1. General: Provide insulation densities and thicknesses to achieve the following R values. R values are for the insulation only, in their installed thickness, considering installed duct wrap stretch and in accordance with code.

2. Lining: Where ducts have internal lining, the insulating properties of the lining may be credited toward meeting the required insulation R value.

3. Supply Air Ductwork:

   a. Inside Building and within conditioned space: No insulation required.

   b. Inside Building but not within conditioned space: R-6.

4. Return Air Ductwork:

   a. Inside Building and within conditioned space: No insulation required.

   b. Inside Building but not within conditioned space: R-6.

5. Outside Air Ductwork: Same insulation for ducts within conditioned space: R-8.

6. Exhaust and Relief Ductwork:

   a. Inside Building and within conditioned space: No insulation required except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated with R-8 insulation.

   b. Inside Building but Not within conditioned space: R-6.

2.05 PIPE INSULATION

A. Glass Fiber:

1. Type: Rigid molded type, constructed of glass fibers bonded by a thermosetting resin, complying with ASTM C 1290, Type III. Insulation factory molded to match pipe size applied to. Johns Manville "Micro- Lok" (or approved).

2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforces with glass fiber and bonded to aluminum foil, with longitudinal self-sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.

3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/hr-sq ft-deg F at 75° F.

4. Operating Temperature Limits: 0° F to 850° F.

B. Elastomeric Insulation:

1. Type: Flexible cellular elastomeric insulation, factory formed to match pipe sizes applied to, complying with ASTM C 534, Type 1. Armacell “AP/Armaflex SS”, Armaflex Shield (or approved equal).

2. Thermal Conductivity: Shall not exceed 0.27 Btu-in/hr-sq ft-deg F at 75° F.

3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.

4. Operating Temperature Limits: -20° F to 180° F.

5. Weather Protection: Where installed outdoors provide Zeston 2000 PVC cover.

C. Pipe Fittings:

1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.

D. Pipe Insulation Types:

1. Aboveground-Inside Building:

a. Hydronic Piping Systems: Glass fiber.

b. Cooling Coil Condensate: Glass fiber or elastomeric.

c. Refrigerant Piping: Elastomeric.

d. Other Systems: Glass fiber.

E. Pipe Insulation Thickness:

COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
A & B	Refrigerants, Brine, and Fluids below 40 F.	Flex. Elastomeric Foam	Less than 8 8 and Up	1 1-1/2
C	Chilled Water, domestic cold water, and other fluids 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All sizes	1

HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
D	Domestic Hot water, Domestic Hot Water recirculating, and other fluids 105 F to 140 F.	Flex. Elastomeric Foam or Fibrous Glass	Less than 1-1/2 1-1/2 &over	1 1-1/2
E	Heating hot water, and other fluids 141 F to 200 F.	Fibrous Glass	Less than 1-1/2 2 &over	1-1/2 2
F	Steam (LPS) to 15 psig 201 F-250 F	Fibrous Glass	Less than 4 4 & Up	2-1/2 3
G	Water and other fluids 251 F to 350 F.	Fibrous Glass	Less than 1 1 & Up	2 4-1/2
H	Water and other fluids Above 350 F.	Fibrous Glass	Less than 1 1 & Up	4-1/2 5

1. Provide minimum piping insulation thickness indicated, in inches.
2. Where a system operates over temperature ranges calling for different insulation thicknesses, the thicker insulation requirements shall be met.
3. Cooling system condensate piping (i.e., from a cooling coil) shall be considered to operate at 53° F.
4. Refrigerant piping (RG or RS piping) returning from an evaporator (i.e., cooling coil) to a compressor shall be considered to operate at 40° F.
5. Outdoor Piping: Piping exposed to outside air or located outside the building/thermal envelope, shall have insulation thickness increased by 0.5 inch from that indicated above.
6. Hydronic heat pump piping shall be considered to operate at 120° F (unless noted otherwise).
7. Cold water piping shall be considered to operate at 56° F (unless noted otherwise).

F. Underground piping:

1. Underground chilled water and hot water:

a. All underground pre-insulated pipe 1 1/2” – 12” shall be similar to thermal pipe systems, inc. heat-tite® piping with ring-tite joints.

b. Steel carrier pipe shall be black steel of the type, grade, and class specified by the design engineer. the pipe shall be suitable for use at maximum hydrostatic working pressure of 150 psi at 250ºf.

c. Each joint shall automatically provide for expansion and contraction through the ethylene propylene diene monomer (epdm) sealing rings in the grooves of the pre-insulated ductile iron coupling.

d. Casing pipe shall be [polyvinyl chloride (pvc) meeting the minimum classification requirements of astm d-1784] or [high density polyethylene (hdpe)]. the thickness shall be in accordance with the thermal pipe systems published data.

e. The insulation shall be polyurethane foam completely encapsulated on each end by a compression rubber end seal.

f. The rubber end seals shall be an ethylene propylene diene monomer (epdm) heat resistant compound.

g. Fittings may be uninsulated using welded steel or ductile iron class 150 fitting with a groove and rubber ring. fittings may also be pre-insulated by thermal pipe systems, inc. using the same carrier pipe, insulation thickness, and casing as the straight lengths of pipe.

h. After completion of hydrostatic testing, joints shall be closed using factory supplied 30 mil high temperature tape. it shall be applied circumferentially around the seam between the coupling and pipe casing.

2. Underground steam and steam condensate piping:

a. All underground pre-insulated steam and condensate pipe 3” – 12” shall be similar to thermal pipe systems, inc. super temp-tite® piping with ring-tite joints.

b. Steel carrier pipe shall meet the requirements of astm a-53 or a-106, grade b. each end of the carrier pipe shall be machined and metalized to provide a non-corrosive surface for the sealing rings. the metalizing shall be high nickel alloy applied to an excess thickness and then machined to the required outside diameter.

c. Each joint shall automatically provide for expansion and contraction through the sealing rings in the grooves of the bronze joining coupling. the sealing rings shall be stainless steel spring loaded molded and machined teflon. pipe must be assembled with the lubricant supplied by thermal pipe systems, inc.

d. Casing pipe shall be fiberglass reinforced thermosetting resin pipe (rtrp) manufactured by a filament winding process. the pipe shall be wound to meet astm d2310 classified rtrp-12e.

e. The composite insulation shall be a twocomponent system. the initial insulation shall be calcium silicate satisfactory for temperatures to 1200ºf and shall conform to astm c-533 and mil spec mil-1-2781. the secondary insulation shall be polyurethane foam completely filling the void between the calcium silicate and casing.

f. The rubber end seals shall be a highly saturated hitrile (hsn) or ethylene propylene diene monomer (epdm) heat resistant compound.

g. Fittings shall be pre-insulated by thermal pipe systems, inc. using the same carrier pipe, insulation thickness, and casing as the straight lengths of pipe.

2.06 EQUIPMENT AND SPECIALTIES INSULATION

A. Flexible Glass Fiber:

1. Type: Flexible blanket insulation, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 553, Type III. Johns Manville “812 Spin-Glas” (or approved).

2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforces with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.

3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/hr-sq ft-deg F at 75° F.

4. Operating Temperature Limits: 40° F to 450° F.

5. Density: 1.5 lb/cu ft.

B. Elastomeric:

1. Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type II.

2. Thermal Conductivity: Shall not exceed 0.30 Btu-in/hr-sq ft-deg F at 75° F.

3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.

4. Operating Temperature Limits: -20° F to 220° F.

5. Weather Protection: Where installed outdoors provide with manufacturer’s weather proof coating to protect from UV and weather exposure.

C. Removable Insulation Blankets:

1. Type: Flexible blanket insulation pads, for insulating valves, unions, strainers, and similar items. Constructed of exterior fabric enclosure sewn around interior insulation, held in position with a closure system that allows for removal of the blanket. Contractor or factory fabricated.

2. Enclosure:

a. Hot Applications: Glass fiber mat, ¼ inch thick, noncombustible, service temperature up to 1200° F. JPS Glass Fabrics “Glastex 2025” (or approved).

b. Cold Application: Silicone impregnated glass fiber cloth, water resistant, ¼ inch thick. Claremont “Claretex SL” (or approved).

3. Insulation: Thermal insulating wool, 1-inch thick, complying with ASTM C 553. Maximum thermal conductivity 0.22 Btu-in/hr-sq ft-deg F at 75° F. Provide in layers to give equivalent R value to the adjacent insulated piping. Owens Corning “Fiberglass Brand TIW, Type II”.

4. Closure System: Steel lacing anchors with spindles and self-locking washers, fabricated of minimum 14 gauge stainless steel, with stainless steel wire ties. AGM Industries “Series NLA” (or approved).

D. Metal Jacket:

1. Steel: Minimum 24 gauge galvanized steel complying with ASTM A 653. Provide with longitudinal slip joints and 2-inch laps.

2. Aluminum: Minimum 0.020-inch thick aluminum, alloy 3003 or 5005, complying the ASTM B 209. Provide with longitudinal slip joints and 2- inch laps.

E. Equipment and Specialties Insulation Types and Thickness:

1. Unless a specific type of insulation is specified or noted, any of the insulation materials specified in this specification section may be used provided such application is in conformance with NCIIS.

2. Insulation Thickness: Insulation thickness shall be the same as that specified for the piping or ductwork connected to item, or as specified for the system the item is installed in (unless noted otherwise). Insulation thickness shall in no case be less than 1 inch thick.

3. Valves:

a. 2 inches and Smaller: Insulate with same material as piping system.

b. 2-1/2 inches and Larger: Removable blanket insulation.

4. Control Valves: Removable blanket insulation.

5. All equipment and specialties where access is required shall have removable insulation blankets; other removable insulation materials per NCIIS may be used where pre-approved by the Engineer. Items requiring such removable insulation include, but are not limited to, the following:

a. Strainers.

b. Pumps.

c. Balancing valves.

d. Pressure/temperature/flow measuring devices.

e. Pump suction diffusers.

f. Heat exchanger heads.

2.07 ACCESSORIES

A. Adhesive, Caulks, Mastics, and Coatings: As recommended by insulation material manufacturer and suited for the application.

B. Bands: ½ inch wide, of stainless steel, galvanized steel, or aluminum construction, to match with materials used with.

C. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor- discharge welding and galvanized speed washer. Pin length shall be as required for insulation thickness used with. Welded pin holding capacity 100 lb., for direct pull perpendicular to the attached surface. Style and type to suit application.

D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness used with. Adhesive as recommended by the anchor pin manufacturer as appropriate for surface temperatures and materials used with, and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface. Style and type to suit application.

2.08 ACOUSTICAL WRAP

A. Type: Composite material having an outer foil faced sound barrier wrap with an internal sound decoupling insulation. Kinetics Noise Control KNM-100ALQ (or equal).

B. Construction: Outer sound barrier material shall be flexible 1.10 inch think, 1 lb/sf (minimum) barium sulfate loaded limp vinyl sheet, bonded to an outside layer of aluminum foil. Interior sound decoupling insulation shall be 1-inch-thick fiberglass batting quilted to a non-woven porous scrim-coated glass cloth in a 4-inch diamond stitch pattern. Material shall be suitable for temperatures form 40 to 200 degrees F.

C. Acoustic Rating: STC (sound transmission coefficient) 28 (or better).

D. Vibration Damping Material: Kinetics Noise Control KDD or DKC-E-162.

PART 3 – EXECUTION

3.01 GENERAL

A. Pre-Insulation Review: No covering materials shall be applied until systems to be covered have had all tests satisfactorily completed, have had all required inspections, and have been satisfactorily reviewed by the Architect-Engineer. All systems shall be examined by the Contractor to confirm cleanliness and other conditions are appropriate to allow for insulation installation.

B. Insulation Work Review: No insulated items shall be concealed in the building structure or buried until the insulation work has been satisfactorily reviewed by the Architect-Engineer, and has had all required inspections.

C. Standards: Materials shall be installed in accordance with manufacturers' written instructions, NCIIS, and shall comply with materials and methods specified herein. The more stringent requirements govern.

D. Joints/Seams: Joints shall be staggered on multi layer insulation. Locate seams and joints in least visible location.

E. Insulation Protection: Insulation shall be kept clean and dry and shall be protected from dirt, damage, and moisture. Insulation that becomes dirty, damaged, or wet and cannot be restored to like new condition will be rejected, and shall immediately be removed from the jobsite.

F. Insulation Interruptions: Insulation shall be neatly finished at all supports, protrusions and interruptions. Provide adhesive and tape seal to maintain vapor barrier integrity.

G. Equipment and Floor Protection: Cover existing equipment and finished floors to protect such items from insulation fiber and dust. Keep all such existing areas in a "broom clean" condition at the end

of each day. Take precautions in these areas to prevent glass fiber and insulation dust from entering ventilation systems or areas adjacent to the work.

H. Glass Fiber Insulation – General:

1. Finish all insulation ends with joint sealing tape or vapor barrier mastic, no raw edges allowed.

2. Joints: Tightly butt adjacent insulation sections together without any voids. Provide overlap of jacket material over all joints.

I. Items To Be Insulated: Provide insulation on all ductwork, all piping, all items installed in these duct and piping systems, all air and liquid energy conveying systems and components, all air and liquid energy storage, all equipment, and all energy consuming devices specified as part of Division 15, except where such insulation has been specifically excluded.

J. Items Excluded From Being Insulated:

1. Fire Sprinkler piping (except where heat traced).

2. Sanitary sewer drain lines (except traps at handicap accessible fixtures).

3. Factory pre-insulated underground piping.

4. Stops and risers at plumbing fixtures (except at handicap accessible fixtures).

5. Factory insulated water heaters (except for base on electric water heaters).

6. Factory insulated tanks.

7. Electric motors.

8. Fans.

9. Factory insulated or factory lined air handler (heat pumps).

10. Overflow condensate drains.

11. Pumps.

12. Relief valves and associated drain piping.

13. Hose bibs (except where used as drains hot water systems).

14. Water meter.

15. Underground cold water piping and associated underground items.

16. Underground hydronic system piping, 5 feet beyond building foundation wall.

3.02 DUCT INSULATION INSTALLATION

A. Types and Thickness: Insulate all ducts with insulation type and thickness (to provide the required R value listed in this specification.

B. General: Insulation shall be firmly butted at all joints. All longitudinal seams for flexible insulation shall overlap a minimum of 2 inches. All joints and seams shall be finished with appropriate joint sealing tape.

C. Attachment: For rectangular ducts over 24 inches wide, duct insulation shall be additionally secured to the bottom of the ductwork with mechanical fasteners on 18 inch centers to reduce sagging. Washers shall be applied without compressing the insulation. Protruding ends of fasteners shall be cut off flush after washers are installed. All seams, joints, penetrations, and damage to the facing shall be sealed with joint sealing tape or vapor retardant mastic or appropriate joint sealing tape.

3.03 PIPE INSULATION INSTALLATION

A. Types and Thickness: Insulate all piping with insulation type and thickness as specified in “Part 2 – Products”. All piping shall be insulated except where specifically excluded.

B. General: All ends shall be firmly butted together and secured with joint sealing tape. All jacket laps and joint sealing tape shall be secured with outward clinch staples at 4 inch spacing, or by use of a suitable adhesive. Seal all jacket penetrations with vapor barrier mastic.

C. Elastomeric Pipe Insulation: Flexible elastomeric cellular insulation shall be installed with seams and joints sealed with rubberized contact adhesive. Insulation with pre-applied adhesive is not permitted. Insulation exposed to weather and not shown to have jacketing shall be protected with UV resistant PVC jacketing as recommended by the manufacturer after the adhesive is dry and cured. A brush coating of adhesive shall be applied to both butt ends to be joined and to both split surfaces to be sealed. The adhesive shall be allowed to set until dry to touch but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one (1) hour after application. Insulation that can be pulled apart one (1) hour after installation shall be replaced.

D. Pipe Hangers: Provide insulation tight up to pre-insulated pipe supports at pipe hangers; seal all joints with joint sealing tape.

E. Pipe Sleeves: Run insulation continuous full size through sleeve. Coordinate work with fire seal work and confirm fire sealant system is approved for use with insulated pipes; see Division 23.

3.04 EQUIPMENT AND SPECIALTIES INSTALLATION

A. Types and Thickness: All equipment and items installed in insulated duct and piping systems shall be insulated except where specifically noted not to be; reference paragraph 3.01. Insulation type and thickness shall be as specified in “Part 2 – Products”.

B. General: Apply insulation as close as possible to equipment by grooving, scoring, and beveling as necessary. As required, secure insulation to equipment with studs, pins, clips adhesive, wires or bands. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. Comply with NCIIS.

C. Removable: All equipment and specialties where access is required for maintenance, repair, service, or cleaning shall have insulation installed so that it can be easily removed and reinstalled without being damaged and without requiring new insulation.

D. Handicap Lavatories: Insulate P-trap and HW supplies below lavatory where exposed.

E. Nameplates: Do not insulate over nameplate or ASME stamps; bevel and seal insulation around.

F. Jacketing: Provide all equipment with vapor retardant jackets.

3.05 ACOUSTIC WRAP

A. Install in accordance with manufacturers written instruction and NCIIS.

B. On ductwork less than 20 gauge, apply vibration damping material on outside of duct before applying thermal insulation or acoustic wrap.

C. Overlap all interior sound insulation joints with a minimum 2 inch overlap of the exterior sound barrier.

D. Acoustical insulation shall not be compressed.

E. Where installed on ducts requiring thermal insulation, install thermal insulation over acoustic wrap.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230713 – DUCT INSULATION - INTERIOR

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and provisions of contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.02 SUMMARY

A. This section includes duct and plenum insulation.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 23 Section “Ductwork” for duct lining.

1.03 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal Operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.

E. Density: Is expressed in lb/cu. ft.

1.04 SUBMITTALS

A. General: Submit the following in accordance with General Conditions of the Contract and Division 01 specification sections.

B. Product and data for each type of duct insulation identifying k-value, thickness, and accessories.

C. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.

D. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.05 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.

1.06 SEQUENCING AND SCHEDULING

A. Schedule insulation application after testing of duct systems.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering 'GREENGUARD' certified products that may be incorporated in the Work include, but are not limited to the following:

1. Glass Fiber:

a. CertainTeed Corporation.
b. Knauf Fiberglass GmbH.
c. Manville.

2.02 GLASS FIBER

A. Material: Inorganic glass fibers, bonded with a thermosetting resin.

B. Jacket: All-purpose, factory-applied, laminated glass-fiber- reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

2. Density: 3 pcf average maximum.

D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets. (maximum 25% compression installed)

1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

E. Adhesive: Produced under the UL Classification and follow-up service.

1. Type: Non-flammable, water-based.
2. Service Temperature Range: Minus 20 to 180 deg F (Minus 29 to 82 deg C).

F. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.03 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, pre-sized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches
2. Cloth Standard: MIL-C-20079H, Type I.
3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304, 0.020 inch thick.
2. Aluminum: 0.0070 inch thick.

C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.

D. Corner Angles: 28-gauge (0.3 mm), 1 inch by 1 inch (25 mm by 25 mm) aluminum, adhered to 2 inches by 2 inches (51 mm by 51 mm) kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.04 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.
2. Temperature Range: Minus 20 to 180 deg F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum.
2. Temperature Range: Minus 50 to 250 deg F.
3. Cooler: Aluminum.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface Preparation: Clean, dry and remove foreign materials such as rust, scale, and dirt.

3.02 INSTALLATION

A. Refer to schedules at the end of this section for materials, forms, jackets, and thicknesses required for each duct system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

C. Install vapor barriers on insulated ducts and plenums having surface operating temperatures below 60 deg.

D. Apply insulation material, accessories, and finishes according to the manufacturer’s printed instructions.

E. Install insulation with smooth, straight, and even surfaces.

F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.

I. Apply water based adhesives and coatings at the manufacturer's recommended coverage-per-gallon rate.

J. Keep insulation materials dry during application and finishing.

K. Install board insulation as follows:

1. Adhesive and Band Attachment: Secure board insulation tight and smooth with at least 50 percent coverage of water based adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.

2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.

L. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:

1. Smaller Than 24 Inches: Bonding water based adhesive applied in 6-inch (150-mm) wide transverse strips on 12-inch centers.

2. 24 inches and Larger: Anchor pins spaced 12 inches (300 mm) apart each way. Apply bonding adhesive to prevent sagging of the insulation.

3. Overlap joints 3 inches.

4. Seal joints, breaks, and punctures with vapor barrier compound.

3.03 JACKETS

A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2 inches (40 mm) laps at longitudinal joints and 3 inches (75 mm) wide butt strips at end joints.

1. Seal openings, punctures, and breaks in vapor barrier jackets, and exposed insulation with vapor barrier compound.

3.04 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this Section.

B. Duct Systems: Insulate all new interior ductwork.

3.05 DUCT SYSTEMS INSULATION SCHEDULE

A. All interior supply and return ducts:

Material	Type	Installed R-value	Vapor Barrier Req'd	Field-Applied Jacket
Glass Fiber	Blanket	6.0	Yes	None

B. All outdoor air intake ducts and outdoor air plenums:

Material	Type	Installed R-value	Vapor Barrier Req'd	Field-Applied Jacket
Glass Fiber	Blanket	8.0	Yes	None

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230714 – DUCT INSULATION - EXTERIOR

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and provisions of contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.02 SUMMARY

A. This section includes exterior supply and return ductwork and plenum insulation.

1.03 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal Operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.

E. Density: Is expressed in lb/cu. ft.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 specification sections.

B. Product and data for each type of duct insulation identifying k-value, thickness, and accessories.

C. Samples of each type of insulation. Identify each sample describing product and intended use. Submit 12 inches square sections of each sample materials.

D. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.

E. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.05 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Exterior Insulation: Flame spread value of 25 or less and a smoke developed value of 50 or less.

1.06 SEQUENCING AND SCHEDULING

A. Schedule insulation application after cleaning and sealing of the new ductwork and testing of duct systems sealing; ductwork to be air and water tight to prevent tempered air exfiltration and water infiltration to SMACNA seal class ‘A’.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ‘GREENGUARD’/’ENERGY-STAR’ certified products that may be incorporated in the Work include, but are not limited to the following:

1. Rigid Foam Insulation:

    a. Owens Corning – Foamular 250.
    b. Dow – Styrofoam Highload 40.
    c. GreenGuard Type VI.

2. Protective Membrane:

    a. MFM Building Products Corp.–FlexClad 250 – 36”-52836 25mils
    b. Polyguard Products–Alumaguard / Alumaguard All Weather

2.02 RIGID FOAM – based on Owens Corning ‘Foamular 250’

A. Material: Extruded closed cell polystyrene (XPS).

B. Board: ASTM C 578, Type IV, rigid board.

1. Thermal Conductivity: 0.20 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

2. Thermal Resistance(R):5.0 per inch at75 deg F mean temperature.

C. Adhesive: Produced under the UL Classification.

1. Type: Non-flammable, water-based.

2. Application Temperature Range: 40ºF to 90ºF.

2.03 PROTECTIVE MEMBRANE – based on MFM – FlexClad 250 – 36”-52836 25mils

A. Material: Outer layer – embossed UV-resistant white weathering surface, multiple layers of high-density cross linked polyethylene and rubberized asphalt adhesive layer. Total thickness = 25 mils.

B. Flame Spread: 0 (ASTM E 84-97a)

C. Smoke Density: 5 (ASTM E 84-97a)

D. Vapor Permeance = 0.01 perms (E-96-95)

E. Adhesive = Modified Asphalt

2.04 ACCESSORIES AND ATTACHMENTS

A. Membrane Tape: (based on MFM 'Peel & Seal')

1. Tape Width: minimum 4 inches white finish
2. Vapor Permeance: <0.01 (ASTM E96)
3. Thickness: 25 mil minimum.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304, 0.020 inch thick.
2. Aluminum: 0.0070 inch thick.

C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.

D. Edge/Corner/Close-off Angles: 28-gauge, 1 inch by 1 inch aluminum, adhered with membrane tape.

E. Anchor Pins **(for primary insulation attachment and for protective membrane covering on ductwork 24" wide and greater)**: Welded copper-coated steel pin for capacitor-discharge welding with a minimum 1 1/2" diameter galvanized speed washer capable of supporting/holding 100 pounds for direct pull perpendicular to the attached surface. Provide anchor pins and speed washers of sizes and diameters as may be otherwise recommended by the manufacturer for insulation type and thickness.

F. Spray Adhesives: based on MFM Spray Adhesive for protective membrane and Ductmate Protack/HV for insulation.

2.05 DUCT SEALING COMPOUNDS

A. Duct Sealant Compound: (based on 'Ductmate' Everseal) Water-based, non-flammable composition.

1. Water Resistant, No VOC's and UV Resistant.
2. Service Temperature Range: Minus 25 to 200 deg F.

B. Weatherproof Sealant: Flexible synthetic latex based, vapor/air barrier sealant designed to seal metal joints and seams.

PART 3 – EXECUTION

3.01 PREPARATION

A. Surface Preparation: Clean, dry and remove foreign materials such as rust, scale, and dirt including existing mastic coating on existing ductwork, existing fiberglass insulation, existing anchor pins, etc. Apply duct sealant compound to all joints and seams including all anchor pin holes, access plates, etc. (Reference SMACNA seal class 'A').

3.02 INSTALLATION

A. Refer to schedules at the end of this section for materials, forms, jackets, and thicknesses required for each duct system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state; follow manufacturer's installation guidelines.

C. Install vapor barriers on insulated ducts and plenums having surface operating temperatures below 60 deg.

D. Apply insulation material, accessories, protective membrane and finishes according to the manufacturer's printed instructions.

E. Install insulation with smooth, straight, and even surfaces. **NOTE: after top of duct insulation is installed, additional top of duct insulation is to be installed and pitched at a minimum of 1/4" per foot to prevent puddling on the top of the ductwork**.

F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier (i.e. exterior ductwork).

G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

H. Seal Ends: Taper ends at 45 degree angle and seal with membrane tape and or spray adhesive.

I. Apply water based adhesives and coatings at the manufacturer's recommended coverage-per-gallon rate.

J. Keep insulation materials dry during application and finishing.

K. Install rigid foam board insulation as follows:

1. Adhesive and Band Attachment: Secure board insulation tight and smooth with at least 50 percent coverage of water based adhesive. Install bands, where required, spaced 12 inches apart. Protect insulation under bands and at exterior corners and edges with metal corner angles. Cover joints, seams, gaps and chipped edges with membrane tape.

2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 12 inches apart each way and 3 inches from insulation joints. Apply membrane tape to insulation in contact, open joints, breaks, punctures, and voids in insulation.

3. Apply protective membrane strickly adhering to the manufacturers installation instructions including 'pinning' on ductwork 24" wide and greater.

3.03 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this Section.

B. Duct Systems: Unless otherwise indicated, insulate the following duct systems:

1. Exterior exposed supply and return ductwork.

3.04 DUCT SYSTEMS INSULATION SCHEDULE

A. EXTERIOR EXPOSED HVAC SUPPLY/RETURN DUCTS AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD- APPLIED JACKET/ MEMBRANE
RIGID FOAM	BOARD	2	YES (JOINTS AND SEAMS)	YES

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 230800 – COMMISSIONING OF HVAC

PART 1 – GENERAL

1.01 DESCRIPTION

A. The purpose of this section is to specify Division 23 responsibilities in the commissioning process.

B. The systems to be commissioned are shown on the Drawings and noted in Section 230590 and Section 230593.

C. Commissioning requires the participation of Division 23 to ensure that all systems are operating in a manner consistent with the Contract Documents. Division 23 shall be familiar with all parts of Division 01 and the commissioning plan issued by the CA and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

D. The commissioning process shall be performed in accordance with the latest Energy Code of New York State.

E. An approved agency or design professional shall perform the commissioning. The Commissioning Agent shall not be affiliated with the Contractor.

1.02 RESPONSIBILITIES

A. Mechanical, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 23 are as follows (all references apply to commissioned equipment only):

1. Construction and Acceptance Phases

    a. Include and itemize the cost of commissioning in the contract price.

    b. In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.

    c. Attend a commissioning scoping meeting and other meetings necessary to facilitate the Cx process.

    d. Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment.

    e. Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.

        1) Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent.

2) The Commissioning Agent may request further documentation necessary for the commissioning process.

3) This data request may be made prior to normal submittals.

f. Provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and approval.

g. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

h. Provide limited assistance to the CA in preparing the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.

i. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the construction checklists from the CA for all commissioned equipment. Submit to CA for review and approval prior to startup. Refer to Section 230590 and Section 230593 for further details on start-up plan preparation.

j. During the startup and initial checkout process, execute the mechanical-related portions of the construction checklists for all commissioned equipment.

k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.

l. Address current A/E punch list items before functional testing. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air- or water-related systems.

m. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

n. Provide skilled technicians to perform functional performance testing under the direction of the CA for specified equipment specified to be commissioned. Assist the CA in interpreting the monitoring data, as necessary.

o. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, OR and A/E and retest the equipment.

p. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

q. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).

r. Provide training of the Owner's operating staff using expert qualified personnel, as specified.

s. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

2. Warranty Period

    a. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.

    b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

B. Mechanical Contractor. The responsibilities of the HVAC mechanical contractor, during construction and acceptance phases in addition to those listed in (A) are:

1. Provide startup for all HVAC equipment, except for the building automation control system.

2. Assist and cooperate with the TAB contractor and CA by:

    a. Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.

    b. Including cost of sheaves and belts that may be required by TAB.

    c. Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.

    d. Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.

3. Install a P/T plug at each water sensor, which is an input point to the control system.

4. List and clearly identify on the as-built drawings the locations of all airflow stations.

5. Prepare a preliminary schedule for Division 23 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.

6. Notify the OR or CA depending on protocol, when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur. Be responsible to notify the OR or CA, ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the CA has the scheduling information needed to efficiently execute the commissioning process.

C. Temperature Controls Contractor. The commissioning responsibilities of the Temperature Controls Contractor, during construction and acceptance phases in addition to those listed in (A) are:

1. Sequences of Operation Submittals. The Temperature Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:

    a. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.

    b. All interactions and interlocks with other systems.

c. Detailed delineation of control between any packaged controls and the building automation system, listing what points the BAS monitors only and what BAS points are control points and are adjustable.

d. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).

e. Start-up sequences.

f. Warm-up mode sequences.

g. Normal operating mode sequences.

h. Unoccupied mode sequences.

i. Shutdown sequences.

j. Capacity control sequences and equipment staging.

k. Temperature and pressure control: setbacks, setups, resets, etc.

l. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.

m. Effects of power or equipment failure with all standby component functions.

n. Sequences for all alarms and emergency shut downs.

o. Seasonal operational differences and recommendations.

p. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.

q. Schedules, if known.

r. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.

2. Control Drawings Submittal

a. The control drawings shall have a key to all abbreviations.

b. The control drawings shall contain graphic schematic depictions of the systems and each component.

c. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.

d. Provide a full points list with at least the following included for each point:

1) Controlled system
2) Point abbreviation

3) Point description
4) Display unit
5) Control point or setpoint (Yes / No)
6) Monitoring point (Yes / No)
7) Intermediate point (Yes / No)
8) Calculated point (Yes / No)

a) Key:
b) Point Description: DB temp, airflow, etc.
c) Control or Setpoint: Point that control equipment and can have its setpoint changed (OSA, SAT, etc.)
d) Intermediate Point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
e) Monitoring Point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
f) Calculated Point: "Virtual" point generated from calculations of other point values.

The Temperature Controls Contractor shall keep the CA informed of all changes to this list during programming and setup.

3. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.

4. Assist and cooperate with the TAB contractor in the following manner:

   a. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).

   b. For a given area, have all required construction checklists, calibrations, startup and selected functional tests of the system completed and approved by the CA prior to TAB.

   c. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.

5. Assist and cooperate with the CA in the following manner:

   a. Using a skilled technician who is familiar with this building, execute the functional testing of the controls system. Assist in the functional testing of all equipment. Provide two-way radios during the testing.

   b. Execute all control system trend logs.

6. The Temperature Controls Contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:

   a. System name.

   b. List of devices.

   c. Step-by-step procedures for testing each controller after installation, including:

1) Process of verifying proper hardware and wiring installation.

2) Process of downloading programs to local controllers and verifying that they are addressed correctly.

3) Process of performing operational checks of each controlled component.

4) Plan and process for calibrating valve and damper actuators and all sensors.

5) A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has "passed" and is operating within the contract parameters.

e. A description of the instrumentation required for testing.

f. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the CA and TAB contractor for this determination.

7. Provide a signed and dated certification to the CA and OR upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.

8. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as specified in Section 230900.

9. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).

D. TAB Contractor. The duties of the TAB contractor, in addition to those listed in (A) are:

1. Six weeks prior to starting TAB, submit to the OR the qualifications of the site technician for the project, including the name of the contractors and facility managers of recent projects the technician on which was lead. The Owner will approve the site technician's qualifications for this project.

2. Submit the outline of the TAB plan and approach for each system and component to the CA, OR and the Temperature Controls Contractor six weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system.

3. The submitted plan will include:

a. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.

b. An explanation of the intended use of the building control system. The Temperature Controls Contractor will comment on feasibility of the plan.

c. All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.

d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.

e. Final test report forms to be used.

f. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the water side.

g. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.

h. Details of how total flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).

i. The identification and types of measurement instruments to be used and their most recent calibration date.

j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.

k. Confirmation that TAB understands the outside air ventilation criteria under all conditions.

l. Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).

m. Details of how building static and exhaust fan / relief damper capacity will be checked.

n. Proposed selection points for sound measurements and sound measurement methods.

o. Details of methods for making any specified coil or other system plant capacity measurements.

p. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.

q. Details regarding specified deferred or seasonal TAB work.

r. Details of any specified false loading of systems to complete TAB work.

s. Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.

t. Details of any required interstitial cavity differential pressure measurements and calculations.

u. Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).

v. Plan for formal progress reports (scope and frequency).

w. Plan for formal deficiency reports (scope, frequency and distribution).

4. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and OR at least twice a week.

5. Communicate in writing to the Temperature Controls Contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.

6. Provide a draft TAB report within two weeks of completion. A copy will be provided to the CA. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.

7. Provide the CA with any requested data, gathered, but not shown on the draft reports.

8. Provide a final TAB report for the CA with details, as in the draft.

9. Conduct functional performance tests and checks on the original TAB.

E. Commissioning Team: The commissioning process will require cooperation of the Contractor, sub-contractors, vendors, Architect/ Engineer, Commissioning Agent, LEED Consultant (if applicable) and Owner.

1. The commissioning team shall be comprised of the following:

a. Contractor

1) Project Manager
2) Test Engineer

b. Subcontractors: As appropriate to product or system being commissioned.

c. Commissioning Agent

1) Project Manager
2) Project Engineers

d. Owner’s Representative(s)

e. LEED Consultant (if applicable)

f. Architect/ Engineer

1) Architect
2) MEP Engineers

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. Division 23 shall provide all test equipment necessary to fulfill the testing requirements of this Division.

PART 3 - EXECUTION

3.01 SUBMITTALS

A. Division 23 shall provide submittal documentation relative to commissioning as required in this Section Part 1, Section 013300.

3.02 STARTUP

A. The HVAC mechanical and Temperature Controls Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in Section 230590 and Section 230593. Division 23 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the commissioning agent or Owner.

B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CA and OR. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all construction checklists as soon as possible.

3.03 TAB

A. Refer to the TAB responsibilities in Part 1.02 above.

3.04 PRE-FUNCTIONAL CHECKLIST

A. A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the Commissioning Agent to the contractor. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The word “pre-functional” refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer’s start-up checklist.

3.05 FUNCTIONAL PERFORMANCE TESTS

A. Test the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, etc. The systems are run through all the control system’s sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB’s primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Agent develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. Functional Performance Tests are performed after pre-functional checklists and startup are complete.

3.06 DEFICIENCY REPORT AND RESOLUTION RECORD

A. Deficiency Report and Resolution Record: Document items of non-compliance in materials, installation, or operation.

B. Non-Conformance. Non-conformance and deficiencies observed shall be addressed immediately, in terms of notification to responsible parties, and providing recommended actions to correct deficiencies.

1. Corrections of minor deficiencies identified may be made during the tests at the discretion of the Commissioning Agent. In such cases the deficiency and resolution shall be documented on the procedure form.

2. For identified deficiencies:

a. If there is no dispute on the deficiency and the responsibility to correct it:
   1) The Commissioning Agent documents the deficiency and the adjustments or alterations required to correct it. The contractor corrects the deficiency and notifies the Commissioning Agent that the equipment is ready to be retested.
   2) The Commissioning Agent reschedules the test and the test is repeated.

b. If there is a dispute about a deficiency or who is responsible:
   1) The deficiency is documented on the non-compliance form and a copy given to the Consultant.
   2) Resolutions are made at the lowest management level possible. Additional parties are brought into the discussions as needed. Contractor shall have responsibility for resolving construction deficiencies. If a design revision is deemed necessary and approved by Owner, Architect/Engineer shall have responsibility for providing design revision.
   3) The Commissioning Agent documents the resolution process.
   4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency and notifies the Commissioning Agent that the equipment is ready to be retested. The Commissioning Agent reschedules the test and the test is repeated until satisfactory performance is achieved.

3. Cost of Retesting: Costs for retesting shall be charged to the Contractor.

3.07 FINAL COMMISSIONING REPORTS

A. Two copies of the final commissioning reports must be provided to the engineer of record and owner.

B. Division 23 shall compile and prepare documentation for all equipment and systems covered in the O&M manuals, according to this section prior to the training of owner personnel.

C. The components of the Commissioning Report shall include the following and are defined as follows:

1. Executive summary of process and results of commissioning – including observations, conclusions and outstanding items.
2. History of any system deficiencies and how resolved.
   a. Include outstanding deficiencies and plans for resolution.
   b. Include plans for seasonal testing scheduled for a later date.
3. System performance test results and evaluations.
4. Summary of training completed and scheduled.
5. Attach commissioning process documents.

a. Commissioning Plan
b. OPR – Owner's Project Goals
c. BOD – Basis of Design
d. Executed installation checklists
e. Executed functional performance test compliance documents.
f. Recommendations for end-of-warranty review activities.

3.08 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

B. Division 23 shall compile and prepare documentation for all equipment and systems covered in Division 23 and deliver this documentation to the GC for inclusion in the O&M manuals, according to this section.

C. The CA shall receive a copy of the O&M manuals for review.

D. Special Control System O&M Manual Requirements. In addition to documentation that may be specified elsewhere, the Temperature Controls Contractor shall compile and organize at minimum the following data on the control system in labeled 3-ring binders with indexed tabs.

1. Four copies of the controls training manuals in a separate manual from the O&M manuals.

2. Operation and Maintenance Manuals containing:

a. Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. These instructions shall be step-by-step. Indexes and clear tables of contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.

b. Full as-built set of control drawings (refer to Submittal section above for details).

c. Full as-built sequence of operations for each piece of equipment.

d. Full points list. In addition to the updated points list required in the original submittals (Part 1 of this section), a listing of all rooms shall be provided with the following information for each room:

1) Floor
2) Room number
3) Room name
4) Air handler unit ID
5) Reference drawing number
6) Air terminal unit tag ID
7) Heating and/or cooling valve tag ID
8) Minimum cfm
9) Maximum cfm

e. Full print out of all schedules and set points after testing and acceptance of the system.

f. Full as-built print out of software program.

g. Electronic copy on disk of the entire program for this facility.

h. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

i. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.

j. Control equipment component submittals, parts lists, etc.

k. Warranty requirements.

l. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).

3. The manual shall be organized and subdivided with permanently labeled tabs for each of the following data in the given order:

a. Sequences of operation
b. Control drawings
c. Points lists
d. Controller / module data
e. Thermostats and timers
f. Sensors and DP switches
g. Valves and valve actuators
h. Dampers and damper actuators
i. Program setups (software program printouts)

4. Field checkout sheets and trend logs should be provided to the CA for inclusion in the Commissioning Record Book.

E. Special TAB Documentation Requirements. The TAB will compile and submit the following with other documentation that may be specified elsewhere in the Specifications.

1. Final report containing an explanation of the methodology, assumptions, test conditions and the results in a clear format with designations of all uncommon abbreviations and column headings.

2. The TAB shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the TAB report.

F. Review and Approvals. Review of the commissioning related sections of the O&M manuals shall be made by the A/E and by the CA.

3.07 TRAINING OF OWNER PERSONNEL

A. Division 23 Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

B. The CA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

C. Mechanical Contractor. The mechanical contractor shall have the following training responsibilities:

1. Provide the CA with a training plan two weeks before the planned training.

2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of HVAC

equipment including, but not limited to, pumps, boilers, furnaces, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.

3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.

4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.

6. The Temperature Controls Contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

7. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.

8. Training shall include:

    a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.

    b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.

    c. Discussion of relevant health and safety issues and concerns.

    d. Discussion of warranties and guarantees.

    e. Common troubleshooting problems and solutions.

    f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.

    g. Discussion of any peculiarities of equipment installation or operation.

    h. The format and training agenda in The HVAC Commissioning Process, ASHRAE latest Guideline is recommended.

    i. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

9. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

10. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.

11. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.

12. Duration of Training. The mechanical contractor shall provide training on each piece of equipment according to the following schedule.

Hours	System
8	Chillers and System
8	Boilers and System
3	Piping Systems
4	Chemical Treatment
12	Air Handler Units
8	VRF Systems
12	Rooftop Units
4	Heat Exchangers
1	Spot Unit Heaters
2	Air Terminal Units
1	Central Exhaust Systems
2	Supplementary Fans
2	Pumps
16	Controls System
16	Control system Follow-up
4	Humidifiers

D. Temperature Controls Contractor. The Temperature Controls Contractor shall have the following training responsibilities:

1. Provide the Commissioning Agent, Architect/ Engineer and CM with a training plan four weeks before the planned training.

2. The Temperature Controls Contractor shall provide designated Owner personnel training on the control system in this facility. The intent is to clearly and completely instruct the Owner on all the capabilities of the control system.

3. Training manuals. The standard operating manual for the system and any special training manuals will be provided for each trainee, with three extra copies left for the O&M manuals. In addition, copies of the system technical manual will be demonstrated during training and three copies submitted with the O&M manuals. Manuals shall include detailed description of the subject matter for each session. The manuals will cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Manuals will be approved by the CA. Copies of audiovisuals shall be delivered to the Owner.

4. The trainings will be tailored to the needs and skill-level of the trainees.

5. The trainers will be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) will be used. The Owner shall approve the instructor prior to scheduling the training.

6. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

7. The Temperature Controls Contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

8. There shall be three training sessions:

   a. Training I. Control System. This training may be held on-site or in the supplier's facility. If held off-site, the training may occur prior to final completion of the system installation. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.

   b. Training II. Building Systems. The second session shall be held on-site and will consist of actual hands-on training after the completion of system commissioning. The session shall include instruction on:

      1) Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.

      2) Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.

      3) All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees will actually set-up trends in the presence of the trainer.

      4) Every screen shall be completely discussed, allowing time for questions.

      5) Use of keypad or plug-in laptop computer at the zone level.

      6) Use of remote access to the system via phone lines or networks.

         a) Setting up and changing an air terminal unit controller.
         b) Graphics generation
         c) Point database entry and modifications
         d) Understanding DDC field panel operating programming (when applicable)

   c. Training III. The third training (Follow-up Training) will be conducted on-site six months after occupancy. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

E. TAB The TAB contractor shall have the following training responsibilities:

1. TAB shall meet for 2 hours with facility staff after completion of TAB and instruct them on the following:

   a. Go over the final TAB report, explaining the layout and meanings of each data type.

   b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.

c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.

d. Discuss any temporary settings and steps to finalize them for any areas that are not finished.

e. Other salient information that may be useful for facility operations, relative to TAB.

3.08 DEFERRED TESTING

A. Unforeseen Deferred Tests:

1. If a test cannot be completed due to the building structure, required occupancy condition, of other deficiency, the functional testing may be delayed upon recommendation of the Commissioning Agent and the approval of the Owner. These tests are conducted in the same manner as the seasonal tests as soon as possible.

B. Seasonal Testing:

1. Schedule, coordinate, observe and document additional testing for seasonal variation in operations and control strategies during the opposite season to verify performance of the HVAC system and controls. Complete testing during the warranty period to fully test all sequences of operation.

C. Update O&M manuals and Record Documents as necessary due to testing.

3.09 WRITTEN WORK PRODUCTS

A. Written work products of Contractors will consist of the start-up and initial checkout plan and the filled out start-up, initial checkout and construction checklists.

END OF SECTION

DIVISION 23 - MECHANICAL

SECTION 23 09 23 - DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, configuration and installation for complete building automation system (also identified as BMS, Direct Digital Control System For HVAC) including all necessary hardware and all operating and applications software as required for the complete performance of the Work, as shown on the Drawings, as specified herein. There is an existing "Andover / Schneider General BMS at this building that is to be modified / amended to include the new / existing HVAC equipment added under this contract.

B. Related Sections: Related sections include, but shall not be limited to, the following:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2. Applicable general requirements for electrical Work specified within Divisions 23, Specification Sections for all equipment within division 22 and 23 apply to this Section.

C. Network level components of the system – workstations, servers, etc. shall communicate using the BACnet protocol, as defined by ASHRAE Standard 135-2004. No gateways shall be used for communication to controllers furnished under this section.

D. At a minimum, provide controls for the following:

1. Air Handling Units

2. Fin Tube Radiators

3. Cabinet unit heaters

4. Exhaust and Supply Fans

5. Unit Ventilators

6. DX / VRF air conditioning systems

7. Energy Recovery Units

E. Except as otherwise noted, the control system shall consist of all necessary Ethernet Network Controllers, Standalone Digital Control Units, Room Controllers, workstations, software, sensors, transducers, relays, valves, dampers, damper operators, control panels, and other accessory equipment, along with a complete system

of electrical interlocking wiring to fill the intent of the specification and provide for a complete and operable system. Line voltage wiring necessary for temperature controls / temperature control power supplies is to be included under this contract. Except as otherwise specified, provide operators for equipment such as dampers if the equipment manufacturer does not provide these. Coordinate requirements with the various Contractors.

F. The BAS system supplier shall review and study all HVAC drawings and the entire specification to familiarize themselves with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.

G. All interlocking wiring, wiring and installation of control devices associated with the equipment listed below shall be provided under this Contract. When the BAS system is fully installed and operational, the BAS system supplier and representatives of the Owner will review and check out the system – see System Acceptance and Testing section of this document. At that time, the BAS system supplier shall demonstrate the operation of the system and prove that it complies with the intent of the drawings and specifications.

H. Provide services and manpower necessary for commissioning of the system in coordination with the HVAC Contractor, Balancing Contractor and Owner's representative.

I. All work performed under this section of the specifications will comply with all governing codes, laws and governing bodies. If the drawings and/or specifications are in conflict with governing codes, the Contractor, with guidance from the engineer, shall submit a proposal with appropriate modifications to the project to meet code restrictions. If this specification and associated drawings exceed governing code requirements, the specification will govern. The Contractor shall obtain and pay for all necessary construction permits and licenses.

J. Related Sections

1. This Section includes the Building Management System (BMS) control equipment for HVAC systems and components, including open protocol control components for terminal heating and cooling units. Depending on the scope of the project, the complete specification may have numerous sections that interface to this section, including several from Division 25, 26, & 28.

2. Additional related sections and sub-sections can apply.

   a. 25 00 10 Intelligent Building Management System (iBMS)

   b. 25 01 00 Operation and Maintenance of Integrated Automation

   c. 25 08 00 Commissioning of Integrated Automation

   d. 25 09 93 Sequence of Operations for HVAC Controls

   e. 25 11 00 Integrated Automation Network Devices

f. 25 13 00 Integrated Automation Control and Monitoring Network
g. 26 09 13 Embedded Power and Energy Management Software
h. 26 09 23.01 Metering and Switchboard Instruments
i. 26 09 23.02 Lighting Control Devices – Photoelectric
j. 26 09 23.03 Lighting Control Devices - Incandescent Dimming
k. 26 09 23.04 Lighting Control Devices - Fluorescent Dimming
l. 26 09 24 Lighting Control Devices - Low Voltage

1.2 REFERENCES

A. General, Code Compliance: The code listed below form a part of this Specification to the extent referenced. The codes are referred to in the text by the basic designation only. The edition/revision of the referenced code shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
1. Provide BAS components and ancillary equipment, which are UL-916 listed and labeled.
2. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.
3. All wiring shall conform to the National Electrical Code.
4. All smoke dampers shall be rated in accordance with UL 555S.
5. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.
6. Comply with FCC, Part 68 rules for telephone modems and data sets.

1.3 DEFINITIONS

A. Unless specifically defined within the Contract Documents, the words or acronyms contained within this specification shall be as defined within, or by the references listed within this specification, the Contract Documents, or, if not listed by either, by common industry practice.
1. Standard
a. ASHRAE: American Society Heating, Refrigeration, Air Conditioning Engineers
b. AHU: Air Handling Unit
c. BACnet: Building Automation Controls Network
d. BMS: Building Management System
e. DDC: Direct Digital Control
f. EIA: Electronic Industries Alliance
g. GUI: Graphical User Interface

h. HVAC: Heating, Ventilation, and Air Conditioning
i. IEEE: Institute Electrical Electronic Engineers
j. MER: Mechanical Equipment Room
k. PID: Proportional, Integral, Derivative
l. VAV: Variable Air Volume Box

2. Communications and protocols
a. ARP: Address Resolution Protocol
b. BACnet: Building Automation and Control Networks
c. CORBA: Common Object Request Broker Architecture
d. CSMA/CD: Carrier Sense Multiple Access/Collision Detect
e. DDE: Dynamic Data Exchange
f. FTP: File Transfer Protocol
g. FTT: Free Topology Transceivers
h. HTTP: Hyper Text Transfer Protocol
i. IIOP: Internet Inter-ORB Protocol
j. IP: Internet Protocol
k. LAN: Local Area Network
l. LON: Echelon Communication – Local Operating Network
m. MS/TP: Master Slave Token Passing
n. OBIX: Open Building Information Exchange
o. ODBC: Open Database Connectivity
p. ORB: Object Request Broker
q. SNVT: Standard Network Variables Types
r. SQL: Structured Query Language
s. UDP: User Datagram Protocol
t. XML: eXtensible Markup Language

3. Controllers
a. ASD: Application Specific Device
b. AAC: Advanced Application Controller
c. ASC: Application Specific Controller
d. CAC: Custom Application Controller
e. DCU: Distributed Control Unit
f. HRC: Hotel Room Controller
g. LCM: Local Control Module
h. MC: MicroControllers
i. MPC: Multi-purpose Controller
j. NSC: Network Server Controller
k. PEM: Package Equipment Module
l. PPC: Programmable Process Controller
m. RC: Room controller
n. RPC: Room Purpose Controller
o. SDCU: Standalone Digital Control Units
p. SLC: Supervisory Logic Controller
q. UEC: Unitary Equipment Controller

r. VAVDDC: Variable Air Volume Direct Digital Controller

4. Tools and Software
   a. AFDD: Automated Fault Detection and Diagnostic
   b. APEO: Automated Predictive Energy Optimization
   c. DR: Demand Response
   d. CCDT: Configuration, Commissioning and Diagnostic Tool
   e. BPES: BACnet Portable Engineering Station
   f. LPES: LON Portable Engineering Station
   g. POT: Portable Operator's Terminal
   h. PEMS: Power and Energy Management Software
   i. MTBF: Mean Time Between Failure

1.4 SYSTEM DESCRIPTION

A. In accordance with the scope of work, the system shall also provide a graphical, web-based, operator interface that allows for instant access to any system through a standard browser. The contractor must provide PC-based programming workstations, operator workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.

B. For this project, the system shall consist of the following components:

1. Administration and Programming Workstation(s): The BAS system supplier shall include Operation software and architecture as described in Part 2 of the specification. These workstations must be running the standard workstation software developed and tested by the manufacturer of the network server controllers and the standalone controllers. No third party front-end workstation software will be acceptable. Workstations must conform to the B-OWS BACnet device profile.
2. Web-Based Operator Workstations: The BAS system supplier shall furnish licenses for web connection to the BAS system. Web-based users shall have access to all system points and graphics, shall be able to receive and acknowledge alarms, and shall be able to control setpoints and other parameters. All engineering work, such as trends, reports, graphics, etc. that are accomplished from the WorkStation shall be available for viewing through the web browser interface without additional changes. The web-based interface must conform to the B-OWS BACnet device profile. There will be no need for any additional computer based hardware to support the web-based user interface.
3. Ethernet-based Network Router and/or Network Server Controller(s): The BAS system supplier shall furnish needed quantity of Ethernet-based Network Server Controllers as described in Part 2 of the specification. These controllers will connect directly to the Operator Workstation over Ethernet at a minimum of 100mbps, and provide communication to the Standalone Digital Control Units and/or other Input/Output Modules. Network Server Controllers shall

conform to BACnet device profile B-BC. Network controllers that utilize RS232 serial communications or ARCNET to communicate with the workstations will not be accepted. Network Controllers shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Building Controllers (B-BC).

4. Standalone Digital Control Units (SDCUs): Provide the necessary quantity and types of SDCUs to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each SDCU will operate completely standalone, containing all of the I/O and programs to control its associated equipment. Each BACnet protocol SDCU shall conform to the BACnet device profile B-AAC. BACnet SDCUs shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Advanced Application Controllers (B-AAC).

C. The Local Area Network (LAN) shall be either a 10 or 100 Mpbs Ethernet network supporting BACnet, Modbus, XML and HTTP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Server Controllers (NSCs), user workstations and a local host computer system.

D. The Enterprise Ethernet (IEEE 802.3) LAN shall utilize Carrier Sense Multiple/Access/Collision Detect (CSMA/CD), Address Resolution Protocol (ARP) and User Datagram Protocol (UDP) operating at 10 or 100 Mbps.

E. The system shall enable an open architecture that utilizes EIA standard 709.1, the LonTalk™ protocol and/or ANSI / ASHRAE™ Standard 135-2004, BACnet functionality to assure interoperability between all system components. Native support for the LonTalk™ protocol and the ANSI / ASHRAE™ Standard 135-2004, BACnet protocol are required to assure that the project is fully supported by the HVAC open protocols to reduce future building maintenance, upgrade, and expansion costs.

F. The system shall enable an architecture that utilizes a MS/TP selectable 9.6-76.8 KBaud protocol, as a common communication protocol between controllers and integral ANSI / ASHRAE™ Standard 135-2004, BACnet functionality to assure interoperability between all system components. The AAC shall be capable of communicating as a MS/TP device or as a BACnet IP device communicating at 10/100 Mbps on a TCP/IP trunk. The ANSI / ASHRAE™ Standard 135-2004, BACnet protocol is required to assure that the project is fully supported by the leading HVAC open protocol to reduce future building maintenance, upgrade, and expansion costs.

G. LonTalk™ packets may be encapsulated into TCP/IP messages to take advantage of existing infrastructure or to increase network bandwidth where necessary or desired.

1. Any such encapsulation of the LonTalk™ protocol into IP datagrams shall conform to existing LonMark™ guide functionality lines for such encapsulation and shall be based on industry standard protocols.

2. The products used in constructing the BMS shall be LonMark™ compliant.
3. In those instances, in which Lon-Mark™ devices are not available, the BMS system supplier shall provide device resource files and external interface definitions for LonMark devices.

H. The software tools required for network management of the LonTalk™ protocol and the ANSI / ASHRAE™ Standard 135-2004, BACnet protocol must be provided with the system. Drawings are diagrammatic only. Equipment and labor not specifically referred to herein or on the plans and are required to meet the functional intent, shall be provided without additional cost to the Owner. BACnet clients shall comply with the BACnet Operator Workstation (B-OWS) device profile; with the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet IP or MS/TP. Physical connection of LonWorks devices shall be via Ethernet IP or FTT-10A.

I. The system shall provide support for Modbus TCP and RTU protocols natively, and not require the use of gateways.

J. Complete temperature control system to be DDC with electronic sensors and electronic/electric actuation of Mechanical Equipment Room (MER) valves and dampers and electronic actuation of terminal equipment valves and actuators as specified herein. The BMS is intended to seamlessly connect devices throughout the building regardless of subsystem type, i.e. variable frequency drives, low voltage lighting systems, electrical circuit breakers, power metering and card access should easily coexist on the same network channel.
1. The supplied system must incorporate the ability to access all data using HTML5 enabled browsers without requiring proprietary operator interface and configuration programs. The system shall not require JAVA to be enabled in the browser.
2. Data shall reside on a supplier-installed server for all database access.
3. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network.

K. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the approved manufacturer's local field office. The approved manufacturer's local field office shall have a minimum of 3 years of installation experience with the manufacturer and shall provide documentation in the bid and submittal package verifying longevity of the installing company's relationship with the manufacturer when requested. Supervision, hardware and software engineering, calibration and checkout of the system shall be by the employees of the approved manufacturer's local field office and shall not be subcontracted. The control contractor shall have an in place

support facility within 100 miles of the site with factory certified technicians and engineers, spare parts inventory and all necessary test and diagnostic equipment for the installed system, and the control contractor shall have 24 hours/day, 7 days/week emergency service available.

L. Provide the Commissioning, configuration and diagnostic tool (CCDT), color display personnel computer, software, and interfaces to provide uploading/downloading of High Point Count Controllers (AAC), Unitary Equipment Controllers (UEC) and VAV controllers (VAVDDC), monitoring all BACnet objects, monitoring overrides of all controller physical input/output points, and editing of controller resident time schedules.

1.5 SUBMITTALS

A. General: Submittals shall be in accordance with the requirements of Section 01 33 00 Submittals and Section 23 00 10 Mechanical, in addition to those specified herein.

1. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the drawings, the Contractor shall furnish a CD containing the identical information. Drawings shall be B size or larger.

2. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typicals will be allowed where appropriate.

3. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification. Valve, damper and air flow station schedules shall indicate size, configuration, capacity and location of all equipment.

4. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs. Diagrams shall be on 11” by 17” foldouts. If color has been used to differentiate information, the printed copies shall be in color.

5. Submit five (5) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor, prior to submitting, shall check all documents for accuracy.

6. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

7. The following is a list of post construction submittals that shall be updated to reflect any changes during construction and re-submitted as “As-Built”.

a. System architecture drawing.
b. Layout drawing for each control panel
c. Wiring diagram for individual components
d. System flow diagram for each controlled system
e. Instrumentation list for each controlled system
f. Sequence of control
g. Binding map
h. A matrix sheet detailing all system addresses and communication settings for the following:
    1) All IP network addresses & settings
    2) All BMS device addresses & communication settings
i. Operation and Maintenance Manuals

8. Information common to the entire system shall be provided. This shall include but not be limited to the following.
    a. Product manuals for the key software tasks.
    b. Operating the system.
    c. Administrating the system.
    d. Engineering the operator workstation.
    e. Application programming.
    f. Engineering the network.
    g. Setting up the web server.
    h. Report creation.
    i. Graphics creation.
    j. All other engineering tasks.
    k. System Architecture Diagram.
    l. List of recommended maintenance tasks associated with the system servers, operator workstations, data servers, web servers and web clients.
    m. Define the task.
    n. Recommend a frequency for the task.
    o. Reference the product manual that includes instructions on executing the task.
    p. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
    q. Licenses, guarantees, and warranty documents for equipment and systems.
    r. Submit one copy for each building, plus two extra copies.

9. Information common to the systems in a single building shall be provided.
    a. System architecture diagram for components within the building annotated with specific location information.
    b. As-built drawing for each control panel.
    c. As-built wiring design diagram for all components.
    d. Installation design details for each I/O device.
    e. As-built system flow diagram for each system.
    f. Sequence of control for each system.

g. Binding map for the building.

h. Product data sheet for each component.

i. Installation data sheet for each component.

j. Submit two copies for each building and two extra copies.

10. Software shall be provided:

a. Submit a copy of all software installed on the servers and workstations.

b. Submit all licensing information for all software installed on the servers and workstations.

c. Submit a copy of all software used to execute the project even if the software was not installed on the servers and workstations.

d. Submit all licensing information for all of the software used to execute the project.

e. All software revisions shall be as installed at the time of the system acceptance.

f. Firmware Files

g. Submit a copy of all firmware files that were downloaded to or pre-installed on any devices installed as part of this project.

h. This does not apply to firmware that is permanently burned on a chip at the factory and can only be replaced by replacing the chip.

i. Submit a copy of all application files that were created during the execution of the project.

j. Submit a copy of all graphic page files created during the execution of the project.

1.6 QUALITY ASSURANCE

A. All bidders must be building automation contractors in the business of installing direct digital control building automation systems for a minimum of 5 years.

1. The Building Management System contractor shall have a full service facility within 100 miles of the project that is staffed with engineers trained and certified by the manufacturer in the configuration, programming and service of the automation system. The contractor’s technicians shall be fully capable of providing instructions and routine emergency maintenance service on all system components.

2. Any installing contractor, not listed as prequalified in the Approved Manufacturer's section, shall submit credentials as detailed in the Pre-bid Submittal section for the engineer’s review 2 weeks prior to bid date. Failure to follow the attached formats shall disqualify potential alternate bidders. Credentials must attest that the contractor meets all requirements of the specification and the Engineers judgment regarding approval to bid as an acceptable installer after reviewing the data will be final.

B. All bidders must be authorized distributors or branch offices of the manufacturers specified.

C. The following bidders have been pre-qualified:
   1. Schneider Electric by Automated Control Logic – Tie into Existing Campus BMS Network
   2. Or as approved by owners.

D. Any installing contractors or manufacturers interested in participating as acceptable bidders for this project that are not pre-qualified shall furnish a detailed technical pre-bid submittal to the consulting engineer. All information must be submitted 2 weeks prior to the published bid date to allow the engineer adequate time to review the bidder’s credentials.

E. The Pre-Bid submittal shall contain the following information as a minimum:
   1. A profile of the manufacturer and the local installation and service/organization.
   2. Description of how the system meets and achieves all the specified criteria in terms of configuration, operation, and control.
   3. System Architecture with single line riser diagram showing all major components (digital controllers, routers, hubs, etc.) that will be required for this project.
   4. Procedure for commissioning and time required to startup and commission each of the systems for this project.
   5. Contractors approach for the project planning and management.
   6. Product Data Sheets for all components, DDC panels, and all accessories listed per the appropriate specification sections herein.
   7. Examples of actual graphic screens for other similar projects.
   8. Number and types of DDC panels required for this installation.
   9. Number and types of spare points provided with the proposed system.
   10. Recommended spare parts list for components with list price schedule.
   11. List of 2 similar systems in size, point capacity, total installed value, installed and commissioned by the local office with a list of the installers/manufacturers design team members for each project and the owners contact information.
   12. Samples of service offerings and a list of current similar service contracts with contact information.
   13. Resumes for the management team and all employees who will be involved with the project design, commissioning, project management, and after installation service. Resumes should include copies of manufacturer's certifications for the proposed product line.
   14. Copy of this Control Specification in its entirety with a check mark beside each paragraph to signify that the

manufacturer's equipment and software shall fully conform to the specified requirement. If the requirement cannot be met, indicate the reasons/limitations and the alternative proposed.

15. An interview may be conducted and the bidder will be requested to make a formal presentation concerning the proposed system and possibly provide an installed project tour prior to a final decision.

F. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report will be submitted to the owner indicating that the installed system functions in accordance with the plans and specifications.

G. The BAS system supplier shall commission and set in operating condition all major equipment and systems, such as the chilled water, DX / VRF, hot water and all air handling systems, in the presence of the equipment manufacturer’s representatives, as applicable, and the Owner and Architect’s representatives. If the vendor is providing an AFDD/CC system, use of the analytics shall be used to help commission the system.

H. Startup Testing shall be performed for each task on the startup test checklist, which shall be initialed by the technician and dated upon test was completion along with any recorded data such as voltages, offsets or tuning parameters. Any deviations from the submitted installation plan shall also be recorded.

I. Required elements of the startup testing include:

1. Measurement of voltage sources, primary and secondary
2. Verification of proper controller power wiring.
3. Verification of component inventory when compared to the submittals.
4. Verification of labeling on components and wiring.
5. Verification of connection integrity and quality (loose strands and tight connections).
6. Verification of bus topology, grounding of shields and installation of termination devices.
7. Verification of point checkout.
8. Each I/O device is landed per the submittals and functions per the sequence of control.
9. Analog sensors are properly scaled and a value is reported
10. Binary sensors have the correct normal position and the state is correctly reported.
11. Analog outputs have the correct normal position and move full stroke when so commanded.
12. Binary outputs have the correct normal state and respond appropriately to energize/de-energize commands.

13. Documentation of analog sensor calibration (measured value, reported value and calculated offset).
14. Documentation of Loop tuning (sample rate, gain and integral time constant).

J. A performance verification test shall also be completed for the operator interaction with the system. Test elements shall be written to require the verification of all operator interaction tasks including, but not limited to the following.
1. Graphics navigation.
2. Trend data collection and presentation.
3. Alarm handling, acknowledgement and routing.
4. Time schedule editing.
5. Application parameter adjustment.
6. Manual control.
7. Report execution.
8. Automatic backups.
9. Web Client access.

K. A Startup Testing Report and a Performance Verification Testing Report shall be provided upon test completion.

1.7 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment from other divisions including "Intrusion Detection," "Lighting Controls," "Motor Control Centers," "Panel boards," and "Fire Alarm" to achieve compatibility with equipment that interfaces with those systems.

C. Supply conditioned electrical circuits for control units, panels, devices, etc..

D. Coordinate location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete".

E. Coordinate with the Owner's IT department on locations for NSC's, Ethernet communication cabling and TCP/IP addresses.

1.8 OWNERSHIP

A. The Owner shall retain licenses to software for this project.

B. The Owner shall sign a copy of the manufacturer’s standard software and firmware licensing agreement as a condition of this contractor. Such license shall grant use of all programs and application software to the Owner as defined by the manufacturer’s license agreement, but shall protect the manufacturer’s rights to disclosure of Trade Secrets contained within such software.

C. The licensing agreement shall not preclude the use of the software by individuals under contract to the owner for commissioning, servicing or altering the system in the future. Use of the software by individuals under contract to the owner shall be restricted to use on the owner's computers and only for the purpose of commissioning, servicing, or altering the installed system.

D. All project developed software, files and documentation shall become the property of the Owner. These include but are not limited to:

1. Server and workstation software
2. Application programming tools
3. Configuration tools
4. Network diagnostic tools
5. Addressing tools
6. Application files
7. Configuration files
8. Graphic files
9. Report files
10. Graphic symbol libraries
11. All documentation
12. System database / memory stick backup of same.

1.9 WORK BY OTHERS

A. The BAS system supplier shall cooperate with other contractors performing work on this project necessary to achieve a complete and neat installation. To that end, each contractor shall consult the drawings and specifications for all trades to determine the nature and extent of others' work.

B. The BAS system supplier shall furnish all Airflow Stations, Control Dampers, Control Valves, Flow Meters, Flow Switches for installation by the Mechanical Contractor and/or others.

C. The BAS system supplier shall provide field supervision to the designated contractor for the installation of the following:

1. Automatic control dampers
2. Blank-off plates for dampers that are smaller than duct size.
3. Sheet metal baffles plates to eliminate stratification.
4. The Electrical Contractor shall provide:
    a. All 120VAC power wiring to motors, heat trace. Power / junction boxes for power to BAS panels shall be by the temperature control contractor.
    b. Furnish smoke detectors and wire to the building fire alarm system. HVAC Contractor to mount devices. BAS system supplier to hardwire to fan shut down.
    c. Auxiliary contact (pulse initiator) on the electric meter for central monitoring of kWh and KW. Electrical Contractor shall provide the pulse rate for remote

readout to the BAS. BAS system supplier to coordinate this with the electrical contractor.

D. Prior to delivery to the Project site, ensure that suitable storage space is available to store materials in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, and corrosive atmospheres. Materials shall be protected during delivery and storage and shall not exceed the manufacturer stated storage requirements. As a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation. In addition, protect electronics from all forms of electrical and magnetic energy that could reasonably cause damage.

E. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified within the Contract Documents.

F. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to the Engineer.

1.10 WARRANTY

A. All components, system software, and parts furnished and installed by the BMS system supplier shall be guaranteed against defects in materials and workmanship for 2 years of substantial completion. Labor to repair, reprogram, or replace these components shall be furnished by the BMS system supplier at no charge during normal working hours during the warranty period. Materials furnished but not installed by the BMS system supplier shall be covered to the extent of the product only. Installation labor shall be the responsibility of the trade contractor performing the installation. All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks. The Contractor shall respond to the owner's request for warranty service within 24 standard working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide products by one of the following pre-qualified manufacturers:

1. Electric Components
    a. Schneider-Electric Field Devices
2. Electronic Components
    a. Schneider-Electric Field Devices
3. Direct Digital Control Systems Field Controller Devices:
    a. Schneider Electric EcoStruxure Building MPX BACnet series, b3 BACnet series, MNB BACnet installed by

approved manufacturer's local field office or authorized distributor.

b. Or approved equal.

2.2 SYSTEM ARCHITECTURE

A. A. General

1. The Building Automation System (BAS) shall consist of Network Server/Controllers (NSCs), a family of Standalone Digital Control Units (SDCUs), Administration and Programming Workstations (APWs), and Web-based Operator Workstations (WOWs). The BAS shall provide control, alarm detection, scheduling, reporting and information management for the entire facility, and Wide Area Network (WAN) if applicable.
2. An Enterprise Level BAS shall consist of an Enterprise Server, which enables multiple NSCs (including all graphics, alarms, schedules, trends, programming, and configuration) to be accessible from a single Workstation simultaneously for operations and engineering tasks.
3. The Enterprise Level BAS shall be able to host up to 250 servers, or NSCs, beneath it.
4. For Enterprise reporting capability and robust reporting capability outside of the trend chart and listing ability of the Workstation, a Reports Server shall be installed on a Microsoft Windows SQL based computer. The Reports Server can be installed on the same computer as the Enterprise Server.
5. The system shall be designed with a top-level 10/100bT Ethernet network, using the BACnet/IP, LonWorks IP, and/or Modbus TCP protocol.

B. Modbus RTU/ASCII (and J-bus), Modbus TCP, BACnet MS/TP, BACnet IP, LonTalk FTT-10A, and WebServices shall be native to the NSCs. There shall not be a need to provide multiple NSCs to support all the network protocols, nor should there be a need to supply additional software to allow all three protocols to be natively supported.

C. A sub-network of SDCUs using the BACnet IP, BACnet MS/TP protocol shall connect the local, stand-alone controllers with Ethernet-level Network Server Controllers/IP Routers.

D. The TCP/IP layer connects all of the buildings on a single Wide Area Network (WAN) isolated behind the campus firewall. Fixed IP addresses for connections to the campus WAN shall be used for each device that connects to the WAN.

E. The fieldbus layer shall support all of the following types of SDCUs:

1. BACnet IP SDCU requirements: The system shall consist of one or more BACnet/IP field buses managed by the Network Server Controller. The field bus layer shall consist of up to 50 IP SDCUs in daisy chain topology, or 39 if using RSTP, per layer, with a max of 5 sub networks in daisy chain for a total of 250 SDCUs or 6 sub networks in RSTP for a total of 234 SDCUs.

2. BACnet MS/TP SDCU requirements: The system shall consist of one or more BACnet MS/TP field buses managed by the Network Server Controller. Minimum speed shall be 76.8kbps. The field bus layer consists of an RS485, token passing bus that supports up to 127 Standalone Digital Control Units (SDCUs) for operation of HVAC and lighting equipment. These devices shall conform to BACnet standard 135-2004. The NSCs shall be capable of at least two BACnet MS/TP field buses for a total capability of 254 SDCUs per NSC.

F. The BAS shall be capable of being segmented, through software, into multiple local area networks (LANs) distributed over a wide area network (WAN). Workstations can manage a single LAN (or building), and/or the entire system with all portions of that LAN maintaining its own, current database.

G. All NSCs, Workstation(s) and Servers shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN with no required gateways. Furthermore, the NSC's, Workstation(s), and Server(s) shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Systems Department as all devices utilize standard TCP/IP components.

H. System Expansion

1. The BAS system shall be scalable and expandable at all levels of the system using the same software interface, and the same TCP/IP level and fieldbus level controllers. Systems that require replacement of either the workstation software or field controllers in order to expand the system shall not be acceptable.
2. Web-based operation shall be supported directly by the NSCs and require no additional software.
3. The system shall be capable of using graphical and/or line application programming language for the Network Server Controllers.

I. All Network Server Controllers must natively support the BACnet IP, BACnet MS/TP, LonWorks FTT-10, Modbus TCP, Modbus RTU (RS-485 and RS-232

2.3 OPERATOR WORKSTATION REQUIREMENTS

A. A. General

1. The operator workstation portion of the BAS shall consist of one or more full-powered configuration and programming workstations, and one or more web-based operator workstations. For this project provide a minimum of 5 concurrent operator users and/or 1 concurrent engineering user within the enterprise server.
2. The programming and configuration workstation software shall allow any user with adequate permission to create and/or

modify any or all parts of the NSC and/or Enterprise Server database.

3. Web-based workstations (webstations) shall have a minimum of 10 concurrent operator users.
4. All configuration workstations shall be personal computers operating under the Microsoft Windows operating system. The application software shall be capable of communication to all Network Server Controllers and shall feature high-resolution color graphics, alarming, trend charting. It shall be user configurable for all data collection and data presentation functions.
5. A minimum of 0 physical Workstations shall be allowed on the Ethernet network. In this client/server configuration, any changes or additions made from one workstation will automatically appear on all other workstations since the changes are accomplished to the databases within the NSC. Systems with a central database will not be acceptable.

B. Administration/Programming Workstation, Enterprise Server, and Enterprise Central Requirements

1. The Enterprise Central shall consist of the following:
   a. Processor
      1) Minimum: Intel Core i5 @ 3.0 GHz or equivalent
      2) Recommended: Intel Core i5 @ 4.0 GHz or better
   b. Memory
      1) Minimum: 6GB
      2) Recommended: 12GB or higher
   c. Operating systems:
      1) Microsoft Windows 8.1 64-bit
      2) Microsoft Windows 10 64-bit
      3) Microsoft Windows Server 2008 R2 64-bit
      4) Microsoft Windows Server 2012 64-bit
      5) Microsoft Windows Server 2012 R2 64-bit
      6) Microsoft Windows Server 2016 R2 64-bit
   d. 10/100MBPS Ethernet NIC
   e. Storage
      1) Minimum: 1TB
      2) Recommended: 4TB
      3) Solid State Drive recommended
   f. Required additional software:
      1) Microsoft .Net 4.7
   g. License agreement for all applicable software
2. The workstation shall consist of the following:
   a. Processor
      1) Minimum: 2.0 GHz
      2) Recommended: 3.0 GHz or higher
   b. Memory
      1) Minimum: 4GB
      2) Recommended: 8GB or higher
   c. Operating systems:
      1) Microsoft Windows 7 64-bit
      2) Microsoft Windows 8.1 64-bit

3) Microsoft Windows 10 64-bit
4) Microsoft Windows Server 2008 R2 64-bit
5) Microsoft Windows Server 2012 64-bit
6) Microsoft Windows Server 2012 R2 64-bit
7) Microsoft Windows Server 2016

d. Serial port, parallel port, USB port

e. 10/100MBPS Ethernet NIC

f. 20 GB hard disk

g. DVD drive

h. High resolution (minimum 1280 x 1024), 17” flat panel display

i. Optical mouse and full function keyboard

j. Audio sound card and speakers

k. Required additional software:
1) Microsoft .Net 4.7

l. License agreement for all applicable software.

C. Web-Based Operator PC Requirements

1. Any user on the network can access the system, using the following software:

a. Minimum:
1) Google Chrome 61 or higher
2) Mozilla Firefox 60 or higher
3) Microsoft Edge (EdgeHTML) 16 or higher
4) Safari 11.1 or higher

b. Recommended:
1) Google Chrome 71 or higher
2) Mozilla Firefox 64 or higher
3) Microsoft Edge (EdgeHTML) 17 or higher
4) Safari 11.4 or higher

D. General Administration and Programming Workstation Software

1. System architecture shall be truly client server in that the Workstation shall operate as the client while the NSCs shall operate as the servers. The client is responsible for the data presentation and validation of inputs while the server is responsible for data gathering and delivery.

2. The workstation functions shall include monitoring and programming of all DDC controllers. Monitoring consists of alarming, reporting, graphic displays, long term data storage, automatic data collection, and operator-initiated control actions such as schedule and setpoint adjustments.

3. Programming of SDCUs shall be capable of being done either off-line or on-line from any operator workstation. All information will be available in graphic or text displays stored at the NSC. Graphic displays will feature animation effects to enhance the presentation of the data, to alert operators of problems, and to facilitate location of information throughout the DDC system. All operator functions shall be selectable through a mouse.

E. User Interface:

1. The BAS workstation software shall allow the creation of a custom, browser-style interface linked to the user when logging into any workstation. Additionally, it shall be possible to create customized workspaces that can be assigned to user groups. This interface shall support the creation of "hot-spots" that the user may link to view/edit any object in the system or run any object editor or configuration tool contained in the software. Furthermore, this interface must be able to be configured to become a user's "PC Desktop" – with all the links that a user needs to run other applications. This, along with the Windows user security capabilities, will enable a system administrator to setup workstation accounts that not only limit the capabilities of the user within the BAS software, but may also limit what a user can do on the PC and/or LAN/WAN. This might be used to ensure, for example, that the user of an alarm monitoring workstation is unable to shutdown the active alarm viewer and/or unable to load software onto the PC.
2. System shall be able to automatically switch between displayed metric vs. imperial units based on the workstation/webstations localization.
3. The BMS workstation/webstations shall be capable of multiple language display, including English, Spanish, German, French, Japanese, Italian, Finnish, Portuguese, Swedish, Russian, and traditional and simplified Chinese. The multiple languages shall not require additional add on software from the standard workstation installer and shall be selectable within said workstation.
4. Webstations shall have the capability to automatically re-direct to an HTTPS connection to ensure more secure communications.
5. Personalized layouts and panels within workstations shall be extended to webstations to ensure consistent user experiences between the two user interfaces.
6. Webstations shall give the user the same capabilities within the graphics pages as are given within the workstation but shall be mobile responsive for use on smaller devices.
7. Servers and clients shall have the ability to be located in different time zones, which are then synchronized via the NTP server.
8. Workstation shall indicate at all times the communication status between it and the server.

F. User Security

1. The software shall be designed so that each user of the software can have a unique username and password. This username/password combination shall be linked to a set of capabilities within the software, set by and editable only by, a system administrator. The sets of capabilities shall range from View only, Acknowledge alarms, Enable/disable and change values, Program, and Administer. The system shall allow the above capabilities to be applied independently to each and every class of object in the system. The system must

allow a minimum of 256 users to be configured per workstation. Additionally, the software shall enable the ability to add/remove users based upon Microsoft Windows Security Domains that enable the customer IT department to assist in user access.

2. Additional requirements include mandatory change of passwords:
   a. At first logon with default credentials
   b. Of admin passwords before deploying
3. No general accounts, one account per user
4. Capability to integrate and use Windows Active Directory for user log on credentials
5. Include a timed auto log off feature
6. Use TLS 1.2 encryption or higher
7. Capability to use blacklisted and whitelisted IPs/MAC addresses to gate access
8. All devices and software that support HTTP shall allow disabling the HTTP access and require access via HTTPS.
9. All devices that have web portals for the configuration of IP addresses and other configuration attributes shall have the ability, through commands issued, to disable this service upon completion. A direct connection method with ASCII commands shall enable this service again if changes need to be applied. Loss of power or cycling the device shall not reverse this command. Disabling this web portal eliminates the security risk and the need for updating security patches.
10. All devices shall support SNMP V3 monitoring of network performance and stack statistics for the purpose of managing denial of service attacks
11. The Integrated Control Platform shall support the feature to alarm on a predetermined period of time until the default password for each device is changed from the default factory setting.
12. The Integrated Control Platform shall support encrypted password authentication for all web services whether serving or consuming.

G. Configuration Interface

1. The workstation software shall use a familiar Windows Explorer style interface for an operator or programmer to view and/or edit any object (controller, point, alarm, report, schedule, etc.) in the entire system. In addition, this interface shall present a “network map” of all controllers and their associated points, programs, graphics, alarms, and reports in an easy to understand structure. All object names shall be alphanumeric and use Windows long filename conventions.
2. The configuration interface shall also include support for user defined object types. These object types shall be used as building blocks for the creation of the BAS database. They shall be created from the base object types within the system input, output, string variables, setpoints, etc., alarm algorithms, alarm notification objects, reports, graphics

displays, schedules, and programs. Groups of user defined object types shall be able to be set up as a predefined aggregate of subsystems and systems. The configuration interface shall support copying/pasting and exporting/importing portions of the database for additional efficiency. The system shall also maintain a link to all "child" objects created. If a user wishes to make a change to a parent object, the software shall ask the user if he/she wants to update all of the child objects with the change.

H. Color Graphic Displays

1. The system shall allow for the creation of user defined, color graphic displays for the viewing of mechanical and electrical systems, or building schematics. These graphics shall contain point information from the database including any attributes associated with the point (engineering units, etc.). In addition, operators shall be able to command equipment or change setpoints from a graphic through the use of the mouse.
2. Requirements of the color graphic subsystem include:
    a. At a minimum, the user shall have the ability to import .gif, .png, .bmp, .jpeg, .tif, and CAD generated picture files as background displays, and layering shall be possible.
    b. The system shall support HTML5 enabled graphics.
    c. It shall be possible for the user to use JavaScript to customize the behavior of each graphic.
    d. The editor shall use Scalable Vector Graphics (SVG) technology.
    e. A built-in library of animated objects such as dampers, fans, pumps, buttons, knobs, gauges, ad graphs which can be "dropped" on a graphic through the use of a software configuration "wizard". These objects shall enable operators to interact with the graphic displays in a manner that mimics their mechanical equivalents found on field installed control panels.
    f. Support for high DPI icons shall be included and automatically chosen if viewing on a high definition display such as Retina or 4K displays.
    g. Using the mouse, operators shall be able to adjust setpoints, start or stop equipment, modify PID loop parameters, or change schedules.
    h. Status changes or alarm conditions must be able to be highlighted by objects changing screen location, size, color, text, blinking or changing from one display to another.
    i. Ability to link graphic displays through user defined objects, alarm testing, or the result of a mathematical expression. Operators must be able to change from one graphic to another by selecting an object with a mouse - no menus will be required.
    j. It shall be possible to create and save graphical components and JavaScript code in reusable and transferrable, customized libraries.

k. Graphics should rescale based on whatever monitor or viewing device is being used.

l. Be able to create graphics on varying layers that can be moved and repeated.

m. Be able to create graphics within varying window panes that can be moved and/or re-referenced. For example, creating the graphical menu within a pane and referencing it on every graphics page, therefore not rebuilding thus allowing for a single spot for updates that get pushed to all the pages that reference it.

n. The ability to create re-usable cascading menus.

o. The ability to have multiple instances of a graphic and edit one instance to change all.

3. Additionally, the Graphics Editor portion of the Engineering Software shall provide the following capabilities:

a. Create and save pages.

b. Group and ungroup symbols.

c. Modify an existing symbol.

d. Modify an existing graphic page.

e. Rotate and mirror a symbol.

f. Place a symbol on a page.

g. Place analog dynamic data in decimal format on a page.

h. Place binary dynamic data using state descriptors on a page.

i. Create motion through the use of animated .gif files or JavaScript.

j. Place test mode indication on a page.

k. Place manual mode indication on a page.

l. Place links using a fixed symbol or flyover on a page.

m. Links to other graphics.

n. Links to web sites.

o. Links to notes.

p. Links to time schedules.

q. Links to any .exe file on the operator work station.

r. Links to .doc files.

s. Assign a background color.

t. Assign a foreground color.

u. Place alarm indicators on a page.

v. Change symbol/text/value color as a function of an analog variable.

w. Change a symbol/text/value color as a function of a binary state.

x. Change symbol/text/value as a function of a binary state.

y. All symbols used by Schneider Electric EcoBuilding Business in the creation of graphic pages shall be saved to a library file for use by the owner.

I. The software shall allow for the automatic collection of data and reporting from any controller or NSC. The frequency of data collection shall be user-configurable.

J. Alarm Management

1. The software shall be capable of accepting alarms directly from NSCs or controllers, or generating alarms based on evaluation of data in controllers and comparing to limits or conditional equations configured through the software. Any alarm (regardless of its origination) will be integrated into the overall alarm management system and will appear in all standard alarm reports, be available for operator acknowledgment, and have the option for displaying graphics, or reports.

2. Alarm management features shall include:

a. A minimum of 1000 alarm notification levels at the NSC, workstation, and webstation levels. At the Enterprise level the minimum number of active and viewable alarms shall be 10,000. Each notification level will establish a unique set of parameters for controlling alarm display, distribution, acknowledgment, keyboard annunciation, and record keeping.

b. Automatic logging in the database of the alarm message, point name, point value, source device, timestamp of alarm, username and time of acknowledgement, username and time of alarm silence (soft acknowledgement).

c. Playing an audible sound on alarm initiation or return to normal.

d. Sending an email page to anyone specifically listed on the initial occurrence of an alarm. The ability to utilize email paging of alarms shall be a standard feature of the software using Simple Mail Transfer Protocol (SMTP) with support for secure email using Simple Mail Transfer Protocol Secure (SMTPS) No special software interfaces shall be required and no email client software must be running in order for email to be distributed. The email notification shall be able to be sent to an individual user or a user group.

e. Individual alarms shall be able to be re-routed to a user at user-specified times and dates. For example, a critical high temp alarm can be configured to be routed to a Facilities Dept. workstation during normal working hours (7am-6pm, Mon-Fri) and to a Central Alarming workstation at all other times.

f. An active alarm viewer shall be included which can be customized for each user or user type to hide or display any alarm attributes.

g. The active alarm viewer can be configured such that an operator must type in text in an alarm entry and/or pick from a drop-down list of user actions for certain alarms.

h. The active alarm viewer can be configured such that an operator must type in text in an alarm entry and/or pick from a drop-down list of causes for certain alarms. This

ensures accountability (audit trail) for the response to critical alarms.

i. The active alarm viewer can be configured such that an operator must confirm that all of the steps in a check list have been accomplished prior to acknowledging the alarm.

j. The active alarm viewer shall, if filtered, show the quantity of visible and total number of alarms that are not equal to 'normal' and the quantity of disabled and hidden alarms.

k. The alarm viewer can be configured to auto hide alarms when triggered.

l. An operator shall have the capability to assign an alarm to another user of the system.

m. Time schedules shall be able to be used to set control notifications to users.

n. An operator shall have the capability to save and apply alarm favorites.

o. Alarm notifications must support multiple distribution methods within one notification.

K. Report Generation

1. The Reports Server shall be able to process large amounts of data and produce meaningful reports to facilitate analysis and optimization of each installation.
2. Reports shall be possible to generate and view from the operator Workstation, and/or Webstation, and/or directly from a reports-only web interface.
3. A library of predefined automatically generated reports that prompt users for input prior to generation shall be available. The properties and configurations made to these reports shall be possible to save as Dashboard reports, so that the configurations are saved for future used.
4. It shall be possible to create reports standard tools, such as Microsoft Report Builder 2.0 or Visual Studio, shall be used for customized reports.
5. Additional reports or sets of reports shall be downloadable, transferrable, and importable
6. All reports shall be able to be set up to automatically run or be generated on demand.
7. Each report shall be capable of being automatically emailed to a recipient in Microsoft Word, Excel, and/or Adobe .pdf format.
8. Reports can be of any length and contain any point attributes from any controller on the network.
9. Image management functionality shall be possible to enable the system administrators to easily upload new logos or images to the system.
10. It shall be possible to run other executable programs whenever a report is initiated.

11. Report Generator activity can be tied to the alarm management system, so that any of the configured reports can be displayed in response to an alarm condition.
12. Minimum supplied reports shall include:
    a. Activities Per Server Report
    b. Activities Per User Report
    c. Alarm Amount by Category Report
    d. Alarm Amount by Type Report
    e. Alarms Per Sever Report
    f. Current Alarm Report
    g. Most Active Alarm Report
    h. System Errors Per Server Report
    i. Top Activities Report
    j. Top Alarms Report
    k. Top System Errors Report
    l. Trend Log Comparison Report
    m. User Logins Report
    n. Users and Groups Reports
13. Minimum Energy Reports shall include:
    a. Energy Monitoring Calendar Consumption Report: Shall provide an interactive report that shows the energy usage on one or multiple selected days.
    b. Energy Monitoring Consumption Breakdown Report: Shall provide a report on energy consumption broken down using sub-metering.
    c. Energy Monitoring Consumption Report: Shall show the energy consumption against a specified target value.
14. Reports Server Hardware Requirements
    a. Processor
        1) Minimum: 2.0 GHz
        2) Recommended: 2.0 GHz or higher
    b. b. Memory
        1) Minimum: 6 GB
        2) Recommended: 8GB or higher
    c. Hard Disk: 500 GB
15. Reports Server Software Requirements
    a. Operating System:
        1) Microsoft Windows 7 32-bit (Professional)
        2) Microsoft Windows 7 64-bit (Professional)
        3) Microsoft Windows 8.1 32-bit (Pro or Enterprise)
        4) Microsoft Windows 8.1 64-bit (Pro or Enterprise)
        5) Microsoft Windows 10 64-bit (Pro or Enterprise)
        6) Microsoft Windows Server 2008 R2 64-bit (Standard, Enterprise, Datacenter, Web, or Itanium)
        7) Microsoft Windows Server 2012 64-bit (Standard)
        8) Microsoft Windows Server 2012 R2 64-bit (Standard, Datacenter)
    b. SQL Versions:
        1) Microsoft SQL Server 2008 R2 64-bit SP2 (Standard and Express with Advanced Services)

2) Microsoft SQL Server 2012 64-bit (Standard and Express with Advanced Services)

c. Additional required software”
1) Microsoft .Net 4.5

L. Scheduling

1. From the workstation or webstation, it shall be possible to configure and download schedules for any of the controllers on the network.
2. Time of day schedules shall be in a calendar style and viewable in both a graphical and tabular view.
3. Schedules shall be programmable for a minimum of one year in advance.
4. To change the schedule for a particular day, a user shall simply select the day and make the desired modifications.
5. Additionally, from the operator webstations, each schedule will appear on the screen viewable as the entire year, monthly, week and day. A simple mouse click shall allow switching between views. It shall also be possible to scroll from one month to the next and view or alter any of the schedule times.
6. Schedules will be assigned to specific controllers and stored in their local RAM memory. Any changes made at the workstation will be automatically updated to the corresponding schedule in the controller.
7. It shall be possible to assign a lead schedule such that shadow/local schedules are updated based upon changes in the Lead.
8. It shall be possible to assign a list(s) of exception event days, dates, date ranges to a schedule.
9. It shall be possible to view combined views showing the calendar and all prioritized exemptions on one screen.
10. It should accommodate a minimum of 16 priority levels.
11. Values should be able to be controlled directly from a schedule, without the need for special program logic.

M. Programmer's Environment

1. Programming in the NSC shall be either in graphical block format or line-programming format or both.
2. Programming of the NSC shall be available offline from system prior to deployment into the field. All engineering tasks shall be possible, except, of course, the viewing of live tasks or values.
3. The programmer's environment will include access to a superset of the same programming language supported in the SDCUs.
4. NSC devices will support both script programming language as well as the graphical function block programming language. For both languages, the programmer will be able to configure application software for custom program development, and write global control programs. Both languages will have debugging capabilities in their editors.

5. It shall be possible to save custom programs as libraries for reuse throughout the system. A wizard tool shall be available for loading programs from a library file in the program editor.
6. The system shall be capable of creating 'custom types'. These types can be created within the programming environment, graphics, or as full controller 'templates' that can be pushed to any other variable pertaining to it to allow for singular reference to multiple objects. This allows easing of updating/changes allowing the use to make a singular change and push to all connected instances.
7. It shall be possible to view graphical programming live and real-time from the Workstation.
8. The system shall be capable of creating 'binding templates' allowing the user to bind multiple points to multiple objects all at once.
9. Key terms should appear when typing (IntelliType).
10. Applications should be able to be assigned different priorities and cycle times for a prioritized execution of different function.
11. The system shall be able to create objects that allow common objects such as power meters, VFD drives, etc. to be integrated into the system with simple import actions without the need of complicated programming or configuration setups.

N. Saving/Reloading
1. The workstation software shall have an application to save and restore NSC and field controller memory files.
2. For the NSC, this application shall not be limited to saving and reloading an entire controller – it must also be able to save/reload individual objects in the controller. This allows off-line debugging of control programs, for example, and then reloading of just the modified information.

O. Audit Trail
1. The workstation software shall automatically log and timestamp every operation that a user performs at a workstation, from logging on and off a workstation to changing a point value, modifying a program, enabling/disabling an object, viewing a graphic display, running a report, modifying a schedule, etc.
2. It shall be possible to view a history of alarms, user actions, and commands for any system object individually or at least the last 5000 records of all events for the entire system from Workstation.
3. The Enterprise server shall be able to store up to 5 million events.
4. The event view shall support viewing of up to 100,000 events.
5. It shall be possible to save custom filtered views of event information that are viewable and configurable in Workstation.
6. It shall be capable to search and view all forced values within the system.

P. Fault Tolerant Enterprise Server Operation (Top level NSC)

1. A single component failure in the system shall not cause the entire system to fail. All system users shall be informed of any detectable component failure via an alarm event. System users shall not be logged off as a result of a system failure or switchover.

Q. Web-based Operator Software

1. General:

a. Day-to-day operation of the system shall be accessible through a standard web browser interface, allowing technicians and operators to view any part of the system from anywhere on the network.

b. The system shall be able to be accessed on site via a mobile device environment with, at a minimum, access to overwrite and view system values.

2. Graphic Displays

a. The browser-based interface must share the same graphical displays as the Administration and Programming Workstations, presenting dynamic data on site layouts, floor plans, and equipment graphics. The browser's graphics shall support commands to change setpoints, enable/disable equipment and start/stop equipment.

b. Through the browser-based interface, operators must be able to navigate through the entire system, and change the value or status of any point in any controller. Changes are effective immediately to the controller, with a record of the change stored in the system database.

c. System shall have out-of-the-box dashboards that enable customizable views of live data which can be public to all users or capable to make them specific to a user based on log in credentials.

d. The user shall have the ability to create custom dashboards.

e. The dashboards shall have a kiosk mode which allows for occupant level data display on monitors or tablets throughout the building.

3. Alarm Management

a. Systems requiring additional client software to be installed on a PC for viewing the webstation from that PC will not be considered.

b. Through the browser interface, a live alarm viewer identical to the alarm viewer on the Administration and Programming workstation shall be presented, if the user's password allows it. Users must be able to receive alarms, silence alarms, and acknowledge alarms through a browser. If desired, specific operator text must be able to be added to the alarm record before acknowledgement, attachments shall be viewable, and alarm checklists shall be available.

R. Groups and Schedules

1. Through the browser interface, operators must be able to view pre-defined groups of points, with their values updated automatically.
2. Through the browser interface, operators must be able to change schedules – change start and stop times, add new times to a schedule, and modify calendars.

S. User Accounts and Audit Trail

1. The same user accounts shall be used for the browser interface and for the operator workstations. Operators must not be forced to memorize multiple passwords.
2. All commands and user activity through the browser interface shall be recorded in the system's activity log, which can be later searched and retrieved by user, date, or both.

T. Web Services

1. The installed system shall be able to use web services to "consume" information within the Network Server/Controllers (NSCs) with other products and systems. Inability to perform web services within the NSCs will be unacceptable.
   a. Shall be able to "consume" data into the system via SOAP and REST web services

2.4 NETWORK SERVER CONTROLLERS (NSC)

A. Network Server Controllers shall combine both network routing functions, control functions, and server functions into a single unit.

B. The BACnet NSC shall be classified as a "native" BACnet device, supporting the BACnet Network Server Controller (B-BC) profile. Controllers that support a lesser profile such as B-SA are not acceptable. NSCs shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Network Server Controllers (B-BC).

C. The Network Server Controller shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NRS.

D. The NSCs shall be capable of whitelisting IPs to restrict access to a pre-defined list of hosts or devices.

E. Whitelisting of file extensions for documents shall be capable.

F. Encrypted and authenticated communication shall be configurable for non-open protocol communications using TLS 1.2.

G. The NSCs shall support Simple Network Management Protocol version 3 (SNMPv3) for monitoring of the NSCs using a Network Management Tool.

H. The NSCs shall support remote system logging for used by System Information and Event Monitoring (SIEM) software.

I. They shall also be responsible for monitoring and controlling their own HVAC equipment such as an AHU or boiler.

J. They shall also contain graphics, trends, trend charts, alarm views, and other similar presentation objects that can be served to workstations or web-based interfaces. A sufficient number of NSCs shall be supplied to fully meet the requirements of this specification and the attached point list.

K. It shall be capable of executing application control programs to provide:
   1. Calendar functions
   2. Scheduling
   3. Trending
   4. Alarm monitoring and routing
   5. Time synchronization by means of an Internet site including automatic synchronization
   6. Native integration of LonWorks controller data and Modbus controller data or BACnet controller data and Modbus controller data
   7. Network Management functions for all LonWorks based devices

L. Hardware Specifications
   1. Memory:
      a. The operating system of the controller, application programs, and all other portions of the configuration database, shall be stored in non-volatile, FLASH memory. Servers/Controllers shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory.
   2. Each NRC shall provide the following on-board hardware for communication:
      a. Two 10/100b Ethernet for communication to Workstations, other NRCs, IP field bus controllers, other SDCUs, and onto the internet.
         1) The two Ethernet ports shall support active switch and BACnet/IP communication protocols.
         2) Support IPv4 addressing
         3) Ethernet port 1 shall support static or DHCP client configuration for communication to Workstation or other NSCs
         4) Ethernet port 2 shall support switch mode or DHCP server to set addressing of DHCP client devices
         5) It shall be possible to disable Ethernet port 2
         6) In DHCP server mode, the Ethernet port 2 shall support 50 BACnet/IP field controllers in daisy chain configuration directly from the port
         7) Each NSC shall be able to support a total of 250 IP SDCUs in daisy chain configuration (5 sub networks via switch)

8) If using RSTP (Rapid Spanning Tree Protocol) with a managed switch (with IEEE 802.1W or IEEE 802.1Q-2014 support), Ethernet port 2 shall support up to 39 devices
9) Each NSC shall be able to support a total of 234 IP SDCUs in RSTP configuration (6 sub networks via managed switch)
10) Where a switch is needed, use a Cisco 9000 Catalyst or IE switch, EtherWAN EX63402-01B, or other equal and approved equivalent.

b. Two RS-485 ports for communication to BACnet MSTP bus or serial Modbus (software configurable)

c. One TP/FT port for communication to LonWorks devices.

d. One device USB port

e. One host USB port

3. The NSC shall conform to a small footprint no larger than 100W x 125H x 75D mm (3.94W x 4.92H x 2.95D in).

M. Modular Expandability:

1. The system shall employ a modular I/O design to allow expansion. Input and output capacity is to be provided through plug-in modules of various types. It shall be possible to combine I/O modules as desired to meet the I/O requirements for individual control applications.

2. One shall be able to "hot-change" (hot-swap) the I/O modules preserving the system on-line without any intervention on the software; addressing and configuration shall be automatic.

3. If for any reason the backplane of the modular I/O system were to fail, I/O module addresses will be protected.

N. Hardware Override Switches:

1. All digital outputs shall, optionally, include three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall be built into the unit and shall provide feedback to the controller so that the position of the override switch can be obtained through software. In addition each analog output shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.

O. Universal Input Temperatures

1. All universal inputs directly connected to the NSC via modular expansion shall be capable of using the following thermistors for use in the system without any external converters needed.

a. 10 kohm Type I (Continuum)

b. 10 kohm Type II (I/NET)

c. 10 kohm Type III (Satchwell)

d. 10 kohm Type IV (FD)

e. Linearized 10 kohm Type V (FD w/11k shunt)

f. Linearized 10 kohm (Satchwell)

g. 1.8 kohm (Xenta)

h. 1 kohm (Balco)

i. 20 kohm (Honeywell)

j. 2.2 kohm (Johnson)

2. In addition to the above, the system shall be capable of using the below RTD sensors, however it is not required that all universal inputs be compatible with them.

a. PT100 (Siemens)

b. PT1000 (Sauter)

c. Ni1000 (Danfoss)

P. Local Status Indicator Lamps:

1. The NSC shall provide as a minimum LED indication of CPU status, Ethernet LAN status, and field bus status. For each input or output, provide LED indication of the value of the point (On/Off). The LED indication shall support software configuration to set whether the illumination of the LED corresponds to On or Off or whether the color when illuminated is Red or Green.

Q. Real Time Clock (RTC):

1. Each NSC shall include a real time clock, accurate to 10 seconds per day. The RTC shall provide the following: time of day, day, month, year, and day of week. Each NSC will allow for its own UTC offset, depending upon the time zone. When the time zone is set, the NSC will also store the appropriate times for daylight savings time.

2. The RTC date and time shall also be accurate, up to 30 days, when the NSC is powerless.

3. No batteries may be used to for the backup of the RTC.

R. Power Supply:

1. The 24 VDC power supply for the NSCs shall provide 30 watts of available power for the NSC and associated IO modules. The system shall support the use of more than one power supply if heavily power consuming modules are required.

2. The power supply, NSC, and I/O modules shall connect power wise and communication wise via the separate terminal base allowing for ease of replacement and no separate or loose wiring.

S. Automatic Restart After Power Failure:

1. Upon restoration of power after an outage, the NSC shall automatically and without human intervention update all monitored functions, resume operation based on current, synchronize time and status, and implement special start-up strategies as required.

T. Data Retention:

1. During a power failure, the NSC shall retain all programs, configuration data, historical data, and all other data that is configured to be retained. There shall be no time restriction for this retention and it must not use batteries to achieve it.

U. Software Specifications

1. The operating system of the controller, application programs, and all other portions of the configuration database such as graphics, trends, alarms, views, etc., shall be stored in non-volatile, FLASH memory. There will be no restrictions placed on the type of application programs in the system. Each NSC shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage, etc.
2. Each NSC shall have an available capacity of 4 GB of memory. This shall represent 2 GB for application and historical data and 2 GB dedicated for backup storage.

V. User Programming Language:

1. The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. The source program shall be either a script-based structured text or graphical function block based and fully programmable by the user. The language shall be structured to allow for the configuration of control programs, schedules, alarms, reports, telecommunications, local displays, mathematical calculations, and histories. Users shall be able to place comments anywhere in the body of either script or function block programs.
2. Network Server Controllers that use a "canned" program method will not be accepted.

W. Control Software:

1. The NSC shall have the ability to perform the following pre-tested control algorithms:
   a. Proportional, Integral plus Derivative Control (PID)
   b. Two Position Control
   c. Digital Filter
   d. Ratio Calculator
   e. Equipment Cycling Protection

X. Mathematical Functions:

1. Each controller shall be capable of performing basic mathematical functions (+, -, *, /), squares, square roots, exponential, logarithms, Boolean logic statements, or combinations of both. The controllers shall be capable of performing complex logical statements including operators such as >, <, =, and, or, exclusive or, etc. These must be able to be used in the same equations with the mathematical operators and nested up to five parentheses deep.

Y. NSCs shall have the ability to perform any or all of the following energy management routines:

1. Time of Day Scheduling
2. Calendar Based Scheduling
3. Holiday Scheduling
4. Temporary Schedule Overrides
5. Optimal Start
6. Optimal Stop
7. Night Setback Control
8. Enthalpy Switchover (Economizer)
9. Peak Demand Limiting
10. Temperature Compensated Duty Cycling
11. CFM Tracking
12. Heating/Cooling Interlock
13. Hot/Cold Deck Reset
14. Hot Water Reset
15. Chilled Water Reset
16. Condenser Water Reset
17. Chiller Sequencing

Z. History Logging:

1. Each NSC controller shall be capable of LOCALLY logging any input, output, calculated value or other system variable either over user defined time intervals ranging from 1 second to 1440 minutes or based upon a user configurable change of value. A minimum of 1000 logs, with a minimum of 100,000 records, shall be stored. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to a higher level NSC long term archiving based upon user-defined time intervals, or manual command.
2. For extended trend logging a minimum of 1500 trends shall be capable, with a minimum number of 600,000 records within.
3. Management of a power meter replacement to ensure meter log data is accurate shall be possible in the NSC.
4. Every hardware input and output point, hosted within the NSC and attached I/O modules, shall be trended automatically without the requirement for manual creation, and each of these logs shall log values based upon a change of value and store at least 500 trend samples before replacing the oldest sample with new data.
5. The presentation of logged data shall be built into the server capabilities of the NSC. Presentation can be in time stamped list formats or in a chart format with fully configurable pen colors, weights, scales and time spans.
6. Tooltips shall be present, magnetic, and visible based on users preference.
7. Comments shall be visible whenever viewing the trend log list.
8. System shall give indication of memory usage and be able to alert the user if too many logs are allocated.

AA. Alarm Management:

1. For each system point, alarms can be created based on high/low limits or in comparison to other point values. All alarms will be tested each scan of the NSC and can result in the display of one or more alarm messages or reports.
2. There is no limit to the number of alarms that can be created for any point
3. Alarms can be configured to be generated based upon a single system condition or multiple system conditions.
4. Alarms will be generated based on an evaluation of the alarm conditions and can be presented to the user in a fully configurable order, by priority, by time, by category, etc. These configurable alarm views will be presented to a user upon logging into the system regardless of whether the log in takes place at a WorkStation or a Webstation.
5. The alarm management system shall support the ability to create and select cause and action notes to be selected and associated with an alarm event. Checklists shall also be possible in order to present to an operator a suggested mode of troubleshooting. When acknowledging an alarm, it shall be possible to assign it to a user of the system such that the user is notified of the assignment and is made responsible for the alarm resolution.
6. Alarms must be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet/IP protocol.

BB. Embedded Web Server

1. Each NSC must have the ability to serve out web pages containing the same information that is available from the WorkStation. The development of the screens to accomplish shall not require any additional engineering labor over that required to show them at the WorkStation itself.
2. The NSC shall be configurable to logging all Embedded Web Server access attempts
3. The NSC shall have the option to redirect HTTP based Embedded Web Server connections to secure, HTTPS connections.
4. The NSC shall authenticate and authorize all users connecting to the Embedded Web Server
5. The NSC shall provide to ability to configure an automatic logoff for Embedded Web Server users that have not had any activity for an adjustable time period.

2.5 BACNET IP FIELDBUS CONTROLLERS

A. Controllers – BACnet/IP Protocol

1. All BACnet/IP Fieldbus controllers shall be BACnet Testing Laboratory listed (v12 or later) as specified BACnet Advanced Application Controller (B-AAC)
2. All BACnet/IP Fieldbus controllers shall use the following communication specifications and achieve performance as specified herein:
   a. All controllers shall be able to communicate peer-to-peer without the need for a NSC

b. Any BACnet/IP Fieldbus controllers on the Ethernet Data Link/Physical layer shall be able to act as a Master to allow for the exchange and sharing of data variables and messages with any other controller connected on the same communication cabling. Slave controllers are not acceptable.

B. The BACnet/IP Fieldbus controllers shall be equipped with 2x 10/100bT Ethernet communication ports with active switch and will support BACnet/IP communication protocols with the following configurations:

1. Supporting IPv4 addressing
2. Supporting Static IP setting, DHCP client and Auto-IP address acquisition
3. It shall be possible to disable Ethernet port 2

C. Topologies

1. BACnet/IP Fieldbus controllers shall support daisy chain topology of up to 50 controllers. In case of any disruption to the communication, a system alarm shall notify the NSC/BMS of the point disruption has occurred.
2. BACnet/IP Fieldbus Controllers shall support RSTP loop whereby up to 39 controllers are supported.
   a. In case of any disruption there shall be no communication interruption
   b. In case of any disruption there shall be system alarms that will inform the operator of the disruption

D. Performance

1. Each BACnet/IP Fieldbus Controllers shall have a 32-bit microprocessor operating at 500 MHz and support a BACnet protocol stack in accordance with the ANSI/ASHRAE Standard 135-2008 and the BACnet Device Profile supported.
2. They shall be multi-tasking, real-time digital control processors consisting of communication controllers, controls processing, power supplies with built-in inputs and outputs.

E. Programmability

1. The BACnet/IP Fieldbus controllers shall support both script programming language and graphical that will be consistent with the NSC.
2. The control program will reside within the same enclosure as the input/output circuitry, that reads inputs and controls outputs
3. All control sequences programmed into the BACnet/IP Fieldbus Controllers shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
4. BACnet/IP Fieldbus controllers shall communicate with the Network Server Controller (NSC) via a BACnet/IP connection at a baud rate of not less than 100 Mbps
5. BACnet/IP Fieldbus controllers shall support a dedicated communications port for connecting and supplying power to a matching room temperature and/or humidity sensor and/or CO2

and/or presence detector that does not utilize any of the I/O points of the controller.

6. BACnet/IP Fieldbus controllers (Excluding VAV) shall support an add-on display to supply and provide access in real-time for monitoring inputs and overriding of outputs
7. The override functionality must be supported by a dedicated processor to assure reliable operation (overriding of output)
8. Each BACnet/IP Fieldbus controller shall have sufficient memory, to support its own operating system and databases, including:
    a. Control processes
    b. Energy management applications
    c. Alarm management
    d. Historical/trend data
    e. Maintenance support applications
    f. Custom processes
    g. Manual override monitoring
9. Each BACnet/IP Fieldbus controller shall support local trend data up to 2x the built-in I/O and at a minimum be capable of holding 5 days @ 15 min intervals locally.
10. The BACnet/IP Fieldbus controller analog or universal input shall use a 16 bit A/D converter.
11. The BACnet/IP Fieldbus controller analog or universal output shall use a 10 bit D/A converter.
12. Built-in I/O: each BACnet/IP Fieldbus controllers shall support:
    a. At minimum 8 and up to 20 configurable IO channels to monitor and to control the following types of inputs and outputs without the addition of equipment inside or outside the DDC Controller cabinet.
        1) Universal Inputs – the following thermistors for use in the system without any external converters needed.
            a) 10 kohm Type I (Continuum)
            b) 10 kohm Type II (I/NET)
            c) 10 kohm Type III (Satchwell)
            d) 10 kohm Type IV (FD)
            e) Linearized 10 kohm Type V (FD w/11k shunt)
            f) Linearized 10 kohm (Satchwell)
            g) 1.8 kohm (Xenta)
            h) 1 kohm (Balco)
            i) 20 kohm (Honeywell)
            j) 2.2 kohm (Johnson)
            k) PT100 (Siemens)
            l) PT1000 (Sauter)
            m) Ni1000 (Danfoss)
        2) Analog inputs
            a) Current Input - 0-20 mA
            b) Voltage Input 0-10 Vdc
        3) Digital inputs from dry contact closure, pulse accumulators, voltage sensing.
        4) Digital outputs
        5) Analog outputs of 4-20 mA and/or 0-10 Vdc

13. Real Time Clock (RTC):
    a. Each BACnet/IP Fieldbus controller shall include a real time clock, accurate to +/-1 minute per month. The RTC shall provide the following: time of day, day, month, year, and day of week.
    b. The RTC date and time shall also be accurate, up to 7 days, when the BACnet/IP Fieldbus controller is powerless.
    c. No batteries may be used to for the backup of the RTC.
14. The BACnet/IP Fieldbus controller for Variable Air Volume (VAV) applications
    a. The BACnet/IP Fieldbus controller for VAV applications shall include a built-in 'flow thru' differential pressure transducer
    b. The VAV differential pressure transducer shall have a measurement range of 0 to 1 in. W.C. and measurement accuracy of ±5% at 0.001 to 1 in. W.C. and a minimum resolution of 0.001 in. W.C., insuring primary air flow conditions shall be controlled and maintained to within ±5% of setpoint at the specified minimum and maximum air flow parameters
    c. The BACnet/IP FieldBus controller for VAV applications shall support a dedicated commissioning tool for air flow balancing
    d. The BACnet/IP Fieldbus controller for VAV applications shall require no programing for air balancing algorithm
    e. All balancing parameters shall be synchronized in NSC
15. The BACnet/IP Fieldbus controller for connected room solutions
    a. In addition, if applicable, the system shall include a BACnet/IP fieldbus controller that integrates control for HVAC, Lighting, Blind Control, BTL, and Zigbee wireless communication in a singular unit.
        1) HVAC IO as described above
        2) Lighting bus, with at minimum, DALI capabilities
        3) Bus for blind control applications
        4) BTL (Bluetooth) wireless capabilities to allow for use of apps, such as commissioning tools and occupant apps for control of space
        5) Zigbee wireless for connection to wireless sensors within the room space, such as occ sensors, door contacts, and smart third party devices, such as trashbins, coffee makers, etc.
    b. The controller shall work with any 3rd party BMS system and can be brought into the host system through the auto discovery mechanism.
16. The BACnet/IP Fieldbus controller for remote IO
    a. The system shall have available a BACnet/IP fieldbus controller to support inclusion of IO that is remote from the controller(s) that may need it.

b. As the controller is just an IO ‘station’ handling data to other controllers it still shall:

1) Support local alarms and local trends

2) No impact firmware update capabilities

3) User defined fallback for outputs in case of network disruption

17. The BACnet/IP Fieldbus room controller

a. For connected room solutions that do not require integrated lighting and blind busses built into a singular unit, the system shall include a BACnet/IP enabled controller specifically designed for room control.

b. The controller shall communicate via BACnet/IP via Wifi.

c. The controller shall be capable of controlling fan coil units, cooling VVT zones with reheat, fin-tube radiators, cabinet heaters, radiant panel heaters, electric re-heat zones, terminal reheats, rooftop units (1H1C, 2H2C, 3H2C, MH2C), or heat pumps, if necessary.

d. The controller shall house an onboard temperature sensor, and options for onboard humidity and occupancy sensor.

e. The controller shall utilize a touch screen interface and have multiple options for casings and fascias. The screen shall be a TFT transmissive LED backlit LCD touchscreen with at least 5 color options.

f. Controller will have password protection to prevent unauthorized access to the configuration menu parameters.

g. The controller will have integrated Zigbee wireless communications with predefined profiles for Zigbee door and window switches, occupancy sensors, water leakage detectors, CO2 sensors, and additional temperature and humidity sensors.

h. The controller will be capable of hosting at least 10 Zigbee sub devices.

i. The controller will be capable of being programmed with customizable scripts via the open programming language Lua. It shall be equipped with at least 256KB of SRAM with 80KB configurable/reserved for Lua scripting purposes.

18. Each BACnet/IP Fieldbus controller shall have a minimum of 10% spare capacity for each point type represented on the controller for future point connection

19. Power Requirements.: 24VDC (21 to 33 VDC) and 24 VAC +/-20% with local transformer power

F. Commissioning Tool - The BACnet/IP Fieldbus controller shall be supported via a dedicate mobile based commissioning tool for configuration, programming, air balancing and I/O checkout

1. The Commissioning Tool shall be supported across: iOS, Android and Windows 10 platforms
2. The Commissioning Tool shall be available for download on App Store, Google Store and Windows Store
3. Commissioning Tool Interface to BACnet/IP Fieldbus controllers shall be via a Bluetooth adapter interface through the Intelligent Space Sensor or via a Wi-Fi access point on the LAN
4. Functionality
    a. Device Configuration – the Commissioning Tool shall be able to set or edit all Network configurations associated with the BACnet/IP Fieldbus controller.
    b. Programming – The Commissioning Tool shall be able to load offline engineered applications directly into the controller directly.
    c. Air Balancing
        1) The Commissioning Tool shall allow the air balancer to manually control the action of the actuator including the following function: open VAV damper, close VAV damper, open all VAV dampers, and close all VAV dampers.
        2) The Commissioning Tool shall be able to generate Air Balancing report
    d. IO Checkout
        1) The Commissioning Tool shall be able to support overriding of the outputs and reading value of inputs live
        2) The Commissioning Tool shall be able to support generation of I/O checkout report
    e. There shall be no limit to the number of Commissioning Tools that can be used on a network segment, however, one connection per controller is recommended

G. Intelligent Space Sensors - The BACnet/IP Fieldbus controller shall support a dedicated RJ45 communication port to communicate and power up to 4 intelligent wall mount sensors without the use of on board inputs or outputs
1. The Intelligent Space Sensor shall communicate with the BACnet/IP Fieldbus controller through the sensor port and via category 5 or category 6 cable
2. The Intelligent Space Sensor shall provide 2 RJ45 communication ports that will allow communication with parent BACnet/IP Field controller upstream and additional Intelligent Space Sensors downstream
3. The Intelligent Space Sensor shall provide ambient space condition sensing without the use of hardware I/O

H. Each Intelligent Space Sensor shall provide a color touch display with:
1. Minimum 61 mm (2.4”) by 61 mm (2.4”) display
2. Backlit

I. The Intelligent Space Sensor shall be capable of displaying measured space temperature from 0 to 50 ˚C (32 to 122 ˚F) with accuracy of ±0.2 ˚C (±0.4 ˚F) selectable for 0.1 or 1 degree display resolution of ˚F or ˚C

1. Sensing Element: 10k Type 3 Thermistor
2. Accuracy of ±0.2 ˚C (±0.4 ˚F)
3. Resolution: 0.1 or 1 degree display resolution
4. Range: 0 to 50 ˚C (32 to 122 ˚F)

J. The Intelligent Space Sensor shall have the option for humidity sensor support sensing humidity from 0 % RH to 100 % RH Digital humidity indication (selectable for 0.1 or 1% RH with selectable display resolution of 0.1 or 1 % RH

1. Accuracy: ±2 % RH
2. Resolution: 0.1 or 1 % RH
3. Range: 0 % RH to 100 % RH

K. The Intelligent Space Sensor shall have the option for support of CO2 sensor with display resolution with 0 to 2000 ppm resolution

1. Accuracy: ±30 ppm ±2% of measured value
2. Range: 0 to 2,000 ppm
3. Operating elevation: 0 to 16,000 ft.
4. Temperature dependence: 0.11% FS per ˚F
5. Stability: <2% of FS over life of sensor (15 years)
6. Sensing method: Non-dispersive infrared (NDIR), diffusion sampling

L. The Intelligent Space Sensor shall have the option for motion sensor

M. Display options: The Intelligent Space Sensor shall be capable of displaying the following elements:

1. Space temperature
2. Cooling space temperature set point
3. Heating space temperature set point
4. Current heating or cooling mode
5. Current occupancy mode
6. Fan speed
7. Current time

2.6 BACNET FIELDBUS AND BACNET SDCUS

A. Networking

1. IP Network: All devices that connect to the WAN shall be capable of operating at 10 megabits per second or 100 megabits per second.
2. IP To Field Bus Routing Devices
   a. A Network Server Controller shall be used to provide this functionality.

b. These devices shall be configurable locally with IP crossover cable and configurable via the IP network.

c. The routing configuration shall be such that only data packets from the field bus devices that need to travel over the IP level of the architecture are forwarded.

B. Field Bus Wiring and Termination

1. The wiring of components shall use a bus or daisy chain concept with no tees, stubs, or free topology.

2. Each field bus shall have a termination resistor at both ends of each segment.

3. The field bus shall support the use of wireless communications.

C. Repeaters

1. Repeaters are required to connect two segments.

2. Repeaters shall be installed in an enclosure. The enclosure may be in an interstitial space.

D. Field Bus Devices

1. General Requirements

a. Devices shall have a light indicating that they are powered.

b. Devices shall be locally powered. Link powered devices (power is furnished from a central source over the field bus cable) are not acceptable.

c. Application programs shall be stored in a manner such that a loss of power does not result in a loss of the application program or configuration parameter settings. (Battery backup, flash memory, etc.)

E. Advance Application Controllers (B-AAC)

1. The key characteristics of a B-AAC are:

a. They have physical input and output circuits for the connection of analog input devices, binary input devices, pulse input devices, analog output devices, and binary output devices. The number and type of input and output devices supported will vary by model.

b. They may or may not provide support for additional input and output devices beyond the number of circuits that are provided on the basic circuit board. Support for additional I/O shall be provided by additional circuit boards that physically connect to the basic controller.

c. The application to be executed by a B-AAC is created by an application engineer using the vendor’s application programming tool.

d. If local time schedules are embedded, the B-AAC shall support the editing of time schedule entries from any BACnet OWS that supports the BACnet service for writing of time schedule parameters.

e. If local trend logging is embedded, the B-AAC shall support the exporting of trend log data to any BACnet

OWS that supports the read range BACnet service for trending.

f. If local alarm message initiation is embedded, the B-AAC shall:
   1) Deliver alarm messages to any BACnet OWS that supports the BACnet service for receiving alarm messages and is configured to be a recipient off the alarm message.
   2) Support alarm acknowledgement from any BACnet OWS that supports the BACnet service for executing alarm/event acknowledgement,

g. Shall support the reading of analog and binary data from any BACnet OWS or Building Controller that supports the BACnet service for the reading of data.

h. Shall support the control of the out of service property and assignment of value or state to analog and binary objects from any BACnet OWS that supports writing to the out of service property and the value property of analog and binary objects.

i. Shall support the receipt and response to Time Synchronization commands from a BACnet Building Controller.

j. Shall support the "Who is" and "I am." BACnet services.

k. Shall support the "Who has" and "I have." BACnet services.

2. Analog Input Circuits

   a. The resolution of the A/D chip shall not be greater than 0.01 Volts per increment. For an A/D converter that has a measurement range of 0 to 10 VDC and is 10 bit, the resolution is 10/1024 or 0.00976 Volts per increment.

   b. For non-flow sensors, the control logic shall provide support for the use of a calibration offset such that the raw measured value is added to the (+/-) offset to create a calibration value to be used by the control logic and reported to the Operator Workstation (OWS).

   c. For flow sensors, the control logic shall provide support for the use of an adjustable gain and an adjustable offset such that a two point calibration concept can be executed (both a low range value and a high range value are adjusted to match values determined by a calibration instrument).

   d. For non-linear sensors such as thermistors and flow sensors the B-AAC shall provide software support for the linearization of the input signal.

3. Binary Input Circuits

   a. Dry contact sensors shall wire to the controller with two wires.

   b. An external power supply in the sensor circuit shall not be required.

4. Pulse Input Circuits

   a. Pulse input sensors shall wire to the controller with two wires.

b. An external power supply in the sensor circuit shall not be required.

c. The pulse input circuit shall be able to process up to 20 pulses per second.

5. True Analog Output Circuits

a. The logical commands shall be processed by a digital to analog (D/A) converter chip. The 0% to 100% control signal shall be scalable to the full output range which shall be either 0 to 10 VDC, 4 to 20 milliamps or 0 to 20 milliamps or to ranges within the full output range (Example: 0 to 100% creates 3 to 6 VDC where the full output range is 0 to 10 VDC).

b. The resolution of the D/A chip shall not be greater than 0.04 Volts per increment or 0.08 milliamps per increment.

6. Binary Output Circuits

a. Single pole, single throw or single pole, double throw relays with support for up to 230 VAC and a maximum current of 2 amps.

b. Voltage sourcing or externally powered triacs with support for up to 30 VAC and 0.5 amps at 24 VAC.

7. Program Execution

a. Process control loops shall operate in parallel and not in sequence unless specifically required to operate in sequence by the sequence of control.

b. The sample rate for a process control loop shall be adjustable and shall support a minimum sample rate of 1 second.

c. The sample rate for process variables shall be adjustable and shall support a minimum sample rate of 1 second.

d. The sample rate for algorithm updates shall be adjustable and shall support a minimum sample rate of 1 second.

e. The application shall have the ability to determine if a power cycle to the controller has occurred and the application programmer shall be able to use the indication of a power cycle to modify the sequence of controller immediately following a power cycle.

8. Local Interface

a. The controller shall support the connection of a portable interface device such as a laptop computer or vendor unique hand-held device. The ability to execute any tasks other than viewing data shall be password protected. Via this local interface, an operator shall be able to:
   1) Adjust application parameters.
   2) Execute manual control of input and output points.
   3) View dynamic data.

F. Application Specific Devices

1. Application specific devices shall have fixed function configurable applications.

2. If the application can be altered by the vendor’s application programmable tool, the device is an advanced application controller and not an application specific device.

3. Application specific devices shall be BTL certified.

G. Room controllers

1. For connected room solutions that do not require integrated lighting and blind busses built into a singular unit, the system shall include a BACnet MS-TP enabled controller specifically designed for room control.

2. The controller shall communicate via BACnet MS-TP. It should also be capable of MODBUS RTU communication.

3. The controller shall be capable of controlling fan coil units, cooling VVT zones with reheat, fin-tube radiators, cabinet heaters, radiant panel heaters, electric re-heat zones, terminal reheats, rooftop units (1H1C, 2H2C, 3H2C, MH2C), or heat pumps, if necessary.

4. The controller shall house an onboard temperature sensor, and options for onboard humidity and occupancy sensor.

5. The controller shall utilize a touch screen interface and have multiple options for casings and fascias. The screen shall be a TFT transmissive LED backlit LCD touchscreen with at least 5 color options.

6. Controller will have password protection to prevent unauthorized access to the configuration menu parameters.

7. The controller will have integrated Zigbee wireless communications with predefined profiles for Zigbee door and window switches, occupancy sensors, water leakage detectors, CO2 sensors, and additional temperature and humidity sensors.

8. The controller will be capable of hosting at least 10 Zigbee sub devices.

9. The controller will be capable of being programmed with customizable scripts via the open programming language Lua. It shall be equipped with at least 256KB of SRAM with 80KB configurable/reserved for Lua scripting purposes.

2.7 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors

1. Acceptable Manufacturers: Veris Industries

2. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of –30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.

3. Room Sensor: Standard space sensors shall be available in an [off white][black] enclosure made of high impact ABS plastic for mounting on a standard electrical box. Basis of Design: Veris TW Series

   a. Where manual overrides are required, the sensor housing shall feature both an optional sliding mechanism for adjusting the space temperature setpoint, as well as a push button for selecting after hours operation.

b. Where a local display is specified, the sensor shall incorporate an LCD display for viewing the space temperature, setpoint and other operator selectable parameters. Using built in buttons, operators shall be able to adjust setpoints directly from the sensor.

4. Duct Probe Sensor: Sensing element shall be fully encapsulated in potting material within a stainless steel probe. Useable in air handling applications where the coil or duct area is less than 14 square feet. Basis of Design: Veris TD Series
5. Duct Averaging Sensor: Averaging sensors shall be employed in ducts which are larger than 14 square feet. The averaging sensor tube shall contain at least one thermistor for every 3 feet, with a minimum tube length of 6 feet. The averaging sensor shall be constructed of rigid or flexible copper tubing. Basis of Design: Veris TA Series
6. Pipe Immersion Sensor: Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Provide sensor probe length suitable for application. Provide each sensor with a corresponding pipe-mounted sensor well, unless indicated otherwise. Sensor wells shall be stainless steel for non-corrosive fluids below 250 degrees F and 300 series stainless steel for all other applications. Basis of Design: Veris TI Series
7. Outside Air Sensor: Provide the sensing element on the building's north side. Sensing element shall be fully encapsulated in potting material within a stainless steel probe. Probe shall be encased in PVC solar radiation shield and mounted in a weatherproof enclosure. Operating range -40 to 122 F, Basis of Design: Veris TO Series
8. A pneumatic signal shall not be allowed for sensing temperature.

B. Humidity Wall Transmitter

1. Acceptable Manufacturer: Veris Industries
2. Transmitters shall be accurate to +/- 2 % at full scale.
3. Transmitter shall have replaceable sensing element.
4. Sensor type shall be thin-film capacitive.
5. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
6. Operating range shall be 0 - 100% RH noncondensing, 50 to 95 F
7. Output shall be field selectable 4-20 mA or 0-5/0-10 VDC.
8. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
9. Transmitter shall be available in an off white enclosure made of high impact ABS plastic for mounting on a standard electrical box.
10. Transmitter shall have option of having an LCD display
11. Transmitter shall have option of being NIST certified
12. Transmitter shall have option of an integrated temperature sensor

13. Basis of Design: Veris HWL Series

C. Humidity Duct Transmitter
   1. Acceptable Manufacturer: Veris Industries
   2. Transmitters shall be accurate to +/- 2 % at full scale.
   3. Transmitter shall be fully encapsulated in potting material within a stainless steel probe.
   4. Transmitter shall have replaceable sensing element.
   5. Sensor type shall be thin-film capacitive.
   6. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
   7. Operating range shall be 0 - 100% RH noncondensing, -40 to 122 F
   8. Output shall be 4-20 mA or 0-5/0-10 VDC.
   9. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
   10. Transmitter shall have option of being NIST certified
   11. Transmitter shall have option of an integrated temperature sensor
   12. Basis of Design: Veris HD Series

D. Humidity Outdoor Transmitter
   1. Acceptable Manufacturer: Veris Industries
   2. Transmitters shall be accurate to +/- 2% at full scale.
   3. Transmitter shall be fully encapsulated in potting material within a stainless steel probe. Probe shall be encased in PVC solar radiation shield and mounted in a weatherproof enclosure.
   4. Transmitter shall have replaceable sensing element.
   5. Sensor type shall be thin-film capacitive.
   6. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
   7. Operating range shall be 0 - 100% RH noncondensing, -40 to 122 F
   8. Output shall be 4-20 mA or 0-5/0-10 VDC.
   9. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
   10. Transmitter shall have option of being NIST certified
   11. Transmitter shall have option of an integrated temperature sensor
   12. Basis of Design: Veris HO Series

E. Carbon Dioxide Wall Transmitter:
   1. Acceptable Manufacturer: Veris Industries
   2. Sensor type shall be Non-dispersive infrared (NDIR).
   3. Accuracy shall be ±30 ppm ±2% of measured value with annual drift of ±10 ppm. Minimum five year recommended calibration interval.
   4. Repeatability shall be ±20 ppm ±1% of measured value
   5. Response Time shall be <60 seconds for 90% step change

6. Outputs shall be field selectable [Analog: 4-20mA or 0-5/0-10VDC][Protocol: Modbus or BACnet] with [SPDT Relay 1A@30VDC][temperature setpoint slider]
7. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
8. Temperature Range: [32° to 122°F (CO2 only)][50° to 95°F (with humidity option)]
9. Output range shall be programmable 0-2000 or 0-5000 ppm
10. Transmitter shall be available in an off white enclosure for mounting on a standard electrical box.
11. Transmitter shall have an option of an LCD display for commissioning and provide additional faceplate to conceal LCD display where occupants may misinterpret CO2 readings.
12. Transmitter shall have option of an integrated temperature sensor and/or humidity sensor
13. Basis of Design: Veris CWL

F. Carbon Dioxide Duct Transmitter:
1. Acceptable Manufacturer: Veris Industries
2. Sensor type shall be Non-dispersive infrared (NDIR).
3. Accuracy shall be ±30 ppm ±2% of measured value with annual drift of ±10 ppm. Minimum five year recommended calibration interval.
4. Repeatability shall be ±20 ppm ±1% of measured value
5. Response Time shall be <60 seconds for 90% step change
6. Outputs shall be field selectable Analog: 4-20mA or 0-5/0-10VDC with SPDT Relay 1A@30VDC
7. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
8. Temperature Range: 32° to 122°F
9. Output range shall be programmable 0-2000 or 0-5000 ppm
10. Enclosure shall not require remote pickup tubes and make use of integrated H-beam probe to channel air flow to sensor.
11. Enclosure lid shall require no screws and make use of snap on features for attachment
12. Enclosure shall be made of high impact ABS plastic
13. Transmitter shall have option of an LCD display
14. Transmitter shall have option of an integrated temperature sensor and/or humidity sensor
15. Basis of Design: Veris CDL

G. Air Pressure Transmitters.
1. Acceptable Manufacturers: Veris Industries
2. Sensor shall be microprocessor profiled ceramic capacitive sensing element
3. Transmitter shall have 14 selectable ranges from 0.1 – 10” WC
4. Transmitter shall be +/- 1% accurate in each selected range including linearity, repeatability, hysteresis, stability, and temperature compensation.
5. Transmitter shall be field configurable to mount on wall or duct with static probe

6. Transmitter shall be field selectable for Unidirectional or Bidirectional
7. Maximum operating pressure shall be 200% of design pressure.
8. Output shall be field selectable 4-20 mA or 0-5/0-10 VDC linear.
9. Transmitter shall accept 12-30 VDC or 24 VAC supply power
10. Response time shall be field selectable T95 in 20 sec or T95 in 2 sec
11. Transmitter shall have an LCD display
12. Units shall be field selectable for WC or PA
13. Transmitter shall have provision for zeroing by pushbutton or digital input.
14. Transmitter shall be available with a certification of NIST calibration
15. Basis of Design: Veris model PXU.

H. Liquid Differential Pressure Transmitters:
1. Acceptable Manufacturer: Veris Industries
2. Transmitter shall be microprocessor based
3. Transmitter shall use two independent gauge pressure sensors to measure and calculate differential pressure
4. Transmitter shall have 4 switch selectable ranges
5. Transmitter shall have test mode to produce full-scale output automatically.
6. Transmitter shall have provision for zeroing by pushbutton or digital input.
7. Transmitter shall have field selectable outputs of 0-5V, 0-10V, and 4-20mA.
8. Transmitter shall have field selectable electronic surge damping
9. Transmitter shall have an electronic port swap feature
10. Transmitter shall accept 12-30 VDC or 24 VAC supply power
11. Sensor shall be 17-4 PH stainless steel where it contacts the working fluid.
12. Performance:
    a. Accuracy shall be ±1% F.S. and ±2% F.S. for lowest selectable range
    b. Long term stability shall be ±0.25%
    c. Sensor temperature operating range shall be -4° to 185°F
    d. Operating environment shall be 14° to 131°F; 10-90% RH noncondensing
    e. Proof pressure shall be 2x max. F.S. range
    f. Burst pressure shall be 5x max. F.S. range
13. Transmitter shall be encased in a NEMA 4 enclosure
14. Enclosure shall be white powder-coated aluminum
15. Transmitter shall be available with a certification of NIST calibration
16. Transmitter shall be preinstalled on a bypass valve manifold

17. Basis of Design: Veris PW

I. Current Sensors

1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in split core models, and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris Industries

J. Current Status Switches for Constant Load Devices

1. Acceptable Manufacturer: Veris Industries
2. General: Factory programmed current sensor to detect motor undercurrent situations such as belt or coupling loss on constant loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory.
3. Visual LED indicator for status.
4. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 0.5 A to 175 A.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Basis of Design: Veris Model H608.

K. Current Status Switches for Constant Load Devices (Auto Calibration)

1. Acceptable Manufacturer: Veris Industries.
2. General: Microprocessor based, self-learning, self-calibrating current switch. Calibration-free status for both under and overcurrent, LCD display, and slide-switch selectable trip point limits. At initial power-up automatically learns average current on the line with no action required by the installer
3. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 2.5 A to 200 A.
4. Display: Backlit LCD; illuminates when monitored current exceeds 4.5A
5. Nominal Trip Point: ±40%, ±60%, or on/off (user selectable)
6. Normally open current sensor output. 0.1A at 30 VAC/DC.
7. Basis of Design: Veris Model H11D.

L. Current Status Switches for Variable Frequency Drive Application

1. Acceptable Manufacturer: Veris Industries.
2. General: Microprocessor controlled, self-learning, self-calibrating current sensor to detect motor undercurrent and overcurrent situations such as belt loss, coupling shear, and mechanical failure on variable loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory and relearn.
3. Visual LED indicator for status.
4. Alarm Limits: ±20% of learned current in every 5 Hz freq. band

5. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 1.5 A to 150 A and from 12 to 115 Hz.
6. Normally open current sensor output. 0.1A at 30 VAC/DC.
7. Basis of Design: Veris Model H614.

M. Liquid Flow, Insertion Type Turbine Flowmeter:
1. Acceptable Manufacturer: Veris Industries
2. General: Turbine-type insertion flow meter designed for use in pipe sizes 1 1/2" and greater. Available in hot tap configuration with isolation valves and mounting hardware to install or remove the sensor from pipeline that is difficult to shut down or drain
3. Performance:
   a. Accuracy ±1% of rate over optimum flow range; ≥10 upstream and ≥5 downstream straight pipe diameters, uninterrupted flow
   b. Repeatability ±0.5%
   c. Velocity Range: 0.3 to 20 FPS
   d. Pressure Drop 0.5 psi or less @ 10 ft/sec for all pipe sizes 1.5" dia and up
   e. Pressure Rating: 1000 psi @ 70°F
4. Maximum Temperature Rating: 300°F
5. Materials: Stainless Steel or Brass body; Stainless steel impeller
6. Transmitter:
   a. Power Supply: 12 - 30VAC or 8 - 35VDC.
      1) Output: [Frequency][4-20 mA][Scaled Pulse]
   b. Temperature Range: 14° to 150°F
   c. Display: 8 character 3/8" LCD (Optional)
   d. Enclosure: NEMA 4, Polypropylene with Viton® sealed acrylic cover
7. Basis of Design: Veris SDI series

N. Liquid Flow/Energy Transmitter, Non-invasive Ultrasonic (Clamp-on):
1. Acceptable Manufacturer: Veris Industries
2. General: Clamp-on digital correlation transit-time ultrasonic flow meter designed for clean liquids or liquids containing small amounts of suspended solids or aeration. Optional temperature sensors for BTU calculations.
3. Liquid: water, brine, raw sewage, ethylene, glycol, glycerin, others. Contact manufacturer for other fluid compatibility
4. Pipe Surface Temperature: Pipe dia 1/2" to 2":-40-185°F; Pipe dia > 2": -40-250°F
5. Performance:
   a. Flow Accuracy:
      1) Pipe dia 1/2" to 3/4" 1% of full scale
      2) Pipe dia 1" to 2" 1% of reading from 4-40 FPS
      3) Pipe dia 2" to 100" 1% of reading from 1-40 FPS

b. Flow Repeatability ±0.01% of reading
c. Velocity Range: (Bidirectional flow)
1) Pipe dia 1/2" to 2" 2 to 40 FPS
2) Pipe dia 2" to 100" 1 to 40 FPS
d. Flow Sensitivity 0.001 FPS
e. Temperature Accuracy (energy): 32-212°F; Absolute 0.45°F; Difference 0.18°F
f. Temperature Sensitivity: 0.05°F
g. Temperature Repeatability: ±0.05% of reading

6. Transmitter:
a. Power Supply: 95 to 264 VAC, 47 to 63 Hz or 10 to 28 VDC.
b. Output: [RJ45][Modbus TCP/IP][Ethernet/IP][BACnet/IP][Pulse][4-20 mA][RS-485 Modbus RTU}
c. Temperature Range: -40 to +185°F
d. Display: 2 line backlit LCD with keypad
e. Enclosure: NEMA 4, (IP65), Powder-coated aluminum, polycarbonate

7. Agency Rating: UL 1604, EN 60079-0/15, CSA C22.2, CSA Class 1 (Pipe > 2")
8. Basis of Design: Veris FST & FSR series

O. Analog Electric/Pneumatic Transducer:
1. Acceptable Manufacturer: Veris Industries
2. General: Micro-controlled poppet valve for high accuracy and with no air loss in the system. Field configurable for pressure sensing in multiple applications.
3. Power Supply: 22-30VDC, 20-30VAC
4. Control Input: 4-20mA, 0-10V, 0-5V; jumper selectable
5. Performance:
a. Accuracy: 1% full scale; combined linearity, hysteresis, repeatability
b. Compensated Temperature Range: 25° to 140°F
c. Temp Coefficient: ±0.05%°C
d. Operating Environment: 10-90% RH, non-condensing; 25° to 140°F
6. Supply Pressure: 45 psig max.
7. Manual Override: Jumper selectable mode, digital pushbutton adjust
8. Alarm Contact: 100mA@30VAC/DC (Optional)
9. Control Range 0-20 psig or 3-15 psig; jumper selectable
10. Pressure Differential 0.1 psig (supply to branch)
11. Pressure Indication Electronic, 3-1/2 digit LCD
12. Housing: Mounted on standard SnapTrack; Optional clear dust cover
13. Basis of Design: Veris EP Series

P. Pressure Independent Control Valves

1. Note: When selecting pressure independent valves the specifier should also revise spec to NOT include balancing valves and also modify to NOT require the individual balancing of each coil/valve combination.
2. NPS 2 and Smaller: PN 16, stainless steel components.
3. NPS 2½ through 10: Class 125 cast iron body per ASME B16.1-2010, Material class B per ASTM A 126-04 (2014), stainless steel components.
4. Accuracy NPS ¾" and Smaller: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 2.32…58 psi for low and standard flow units, 5…58 psi for high flow units within 5% of set flow value.
5. Accuracy NPS 1 through 1¼: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 2.9…58 psi for standard flow units, 5…58 psi for high flow units within 5% of set flow value.
6. Accuracy NPS 1½ through 4: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 4.35…58 psi within 5% of set flow value.
7. Accuracy NPS 5 through 10: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 5.8…58 psi for standard flow units, 8.7…58 psi for high flow units within 5% of set flow value.
8. Flow Characteristics: Linear Control, selectable to equal percentage at the proportional valve actuator.
9. Field adjustable flow by means of a percentage of rated valve flow.
10. Position feedback output signal integrated into all proportional actuators.
11. 100% authority with modulating below 1% regardless of flow settings.
12. No cartridges requiring replacement or maintenance.
13. Close ratings shall be 232 psi for all valve sizes.
14. Basis of Design: Schneider Electric SmartX PICV, or approved equal.

Q. Control Valve Actuators
1. ½" to ¾" Ball Valve Actuators
    a. Size for torque required for valve close-off pressure for system design.
    b. Coupling: Direct coupled to valve body without use of external devices/tools
    c. Auxiliary End Switch (optional) to be SPST 24 Vac/Vdc,101 mA to 5 mA maximum on selected two-position models.
    d. Controller Signal Two-position, Floating or Proportional (0…5 Vdc, 0…10 Vdc, 5…10 Vdc, or 4…20 mA dc). Design allows for change via DIP switches without removal of cover.
    e. Manual operating lever and position indicator must be standard.

f. Power Requirements: 24 Vac for floating, proportional, and 110…230 Vac for two position multi-voltage types

g. Actuators must be available with either Spring Return (SR) or Non-Spring Return (NSR) models.

h. Operating Temperature Limit Floating is to be 32…140°F (0…60°C) Proportional 32…140°F (0…60°C) Two-Position 32…169°F (0…76°C)

i. Wiring (depending on model) Removable Terminal Block, 10 ft. (3.05 m) Plenum Cable, 18 in. (45 cm) Appliance Wire

j. Locations must be rated NEMA 2, IEC IP31. (Indoor Use Only.) Actuators with terminal block or plenum cable leads are plenum rated per UL file number E9429.

k. Agency Listings: ISO 9001, cULus, and CE.

l. Basis of Design: Schneider Electric VBB/VBS, or approved equal.

2. ½" to 3" 2-way and ½" to 2" 3-way Ball Valves Actuators

a. Size for torque required for valve close-off pressure for system design.

b. Actuators are to be available in spring return (SR) and non-spring return (NSR) models. Spring Return (SR) actuators are to provide a choice to return direction.

c. Actuators are to be available in models for two-position, floating and proportional control.

d. All actuator models are to be equipped with pigtail leads, manual override, and auxiliary switch(es)

e. Operating temperatures' Floating Non-Spring Return (NSR) with 33 lb.-in. of torque must be -25 to 130 °F (-32 to 55°C). All other actuators are to -22 to 140 °F (-30 to 60 °C)

f. Actuators must be NEMA 2 rated.

g. Agency Listings: ISO 9001, cULus, and CE.

h. Basis of Design: Schneider Electric VB-2000, or approved equal.

3. ½" to 2" Bronze, Linear Globe Valve Actuators/67 or 78 lbs. force

a. Actuator must have bi-color LED status indication for motion indication, auto calibration and alarm notification.

b. When the actuator is properly mounted must have a minimum of a NEMA 2 (IP53) rating.

c. Actuators are to be non-spring return.

d. Actuators are to be floating (used for two-position) or proportional models.

e. Proportional models will have optional models with a position output signal with field selectable 2…10 Vdc and 0…10 Vdc input signals and selectable input signal direct or reverse acting.

f. Actuator must have auto calibration which provides precise control by scaling the input signal to match the exact travel of the valve stem

g. Actuators must come in models with Pulse Width Modulated (PWM) with field selectable 0.59 to 2.93 sec and 0.1 to 25.5 sec input signal ranges with a position output signal

h. Actuators must have manual override with automatic release.

i. Models with position feedback output signal include field selectable 2…10 Vdc or 0…5 Vdc output signal

j. Removable wiring screw terminal with ½" conduit opening.

k. Actuator operating temperature ranges:

1) When controlling fluid up to 266°F (130°C) = ambient air temperature is to be 23…131°F (-5…55°C)

2) Fluid up to 281°F (138°C) = 23…127°F (-5…53°C)

3) Fluid up to 340°F (171°C) = 23…115°F (-5…46°C)

4) Fluid up to 400°F (204°C) = 23…102°F (-5…39°C)

l. Actuator agency Listings: cUL-us LISTED mark, NEMA 2, NEC class 2 FCC part-15 class B, Canadian ICES-003, ESA registered, Plenum rated per UL 20430

m. Basis of Design: Schneider Electric MG350V, or approved equal.

4. ½" to 2" Bronze, Linear Globe Valve Actuators/105 lbs. force

a. Actuators must have Two- Position, Floating, and Proportional models.

b. Proportional models will a controller input signal of either a 0…10 Vdc, 2…10 Vdc, 4…20 mAdc, 0…3 Vdc, or 6…9 Vdc. Control function direct/reverse action is switch selectable on most models.

c. Actuator force is to be 105 lb. (467 newton) with ½" (13 mm) nominal linear stroke

d. Power requirements 24 Vac, 120 Vac or 230 Vac depending on model.

e. Actuator housings rated for up to NEMA 2/ IP54.

f. Actuator is to have overload protection throughout stroke.

g. Actuator Operating temperature -22…140°F (-30…60°C) up to a maximum valve fluid temperature of 366°F (186°C).

h. Actuator must automatically set input span to match valve travel.

i. Actuator must have manual override to allow positioning of valve and preload.

j. Actuator is to be spring return.

k. Actuator is to mount directly to valves without separate linkage.

l. Actuator agency Listings: UL 873, CUL: UL

m. Basis of Design: Schneider Electric SmartX Mx51-7103, or approved equal

5. ½" to 2" Bronze, Linear Globe Valve Actuators/220 lbs. force

a. Actuators must have Two- Position for a SPST controller, Floating for a SPST controller, and Proportional models will a controller input signal of either a 0…10 Vdc,

2…10 Vdc, 4…20 mAdc, or 6…9 Vdc. Control function direct/reverse action is jumper selectable

b. Actuator is to be spring return.

c. Actuator will have 220 lb. force (979 newton) with ½" (13 mm) or 1" (25 mm) nominal linear stroke

d. Feedback on proportional model with 2…10 Vdc (max. 0.5 mA) output signal or to operate up to four like additional slave actuators.

e. Actuator operating temperature is 0…140°F (-18…60°C) up to a maximum valve fluid temperature of 281°F (138°C), 0…120°F (-18…49°C) up to a maximum valve fluid temperature of 300°F (149°C), 0…100°F (-18…38°C) up to a maximum valve fluid temperature of 340°F (171°C), 0…90°F (-18…32°C) up to a maximum valve fluid temperature of 366°F (186°C).

f. Actuator must automatically set input span to match valve travel

g. Actuator is to have a 24 Vac power supply on Two-position and Proportional models and 120 Vac on Two-position models.

h. Actuator housings rated for up to NEMA 2/ IP54

i. Actuator must have manual override to allow positioning of valve and preload

j. Actuator is to mount directly to vales without separate linkage.

k. Actuator agency Listings: UL 873, CUL: UL

l. Basis of Design: Schneider Electric SmartX Mx51-720x, or approved equal.

6. ½" to 2" Bronze, Linear Globe Valve Actuators with linkage SR

a. Actuators with 35, 60, 133, or 150 lb.-in of force depending on model.

b. Actuator housings rated for up to NEMA 2/ IP54 with a 150 lb.-in. rated a NEMA 4.

c. Actuators are to be spring return.

d. Actuators are to have Two-position, Floating and Proportional models.

e. Actuators must have overload protection throughout rotation.

f. Actuator have an optional built-in auxiliary switch to provide for interfacing or signaling on selected models.

g. Actuator agency listings: UL-873, C22-2 No.24-83, CUL0

h. Basis of Design: Schneider Electric SmartX, or approved equal.

7. ½" to 2" Bronze Body, Linear Globe Valve Actuators with linkage SR & NSR

a. Actuators are to be either floating SPDT control or proportional control 0…10, 2…10 Vdc or 4…20 mA with a 500-ohm resistor included.

b. Actuators are to be direct/reverse with selectable DIP switches.

c. Actuators are to have 90 lb. (400N), 180 lb. (800N), or 337 lb. (1500N) of force on Non-Spring Return (NSR) 157 lb. of force on the Spring Return model. Note: Not every actuator is for every valve.

d. Actuators are to be powered with 24 Vac or 24 Vdc.

e. All Non-Spring Return (NSR) actuators are to be NEMA 2, vertical mount only. Spring Return (SR) actuators are to have NEMA 4 models.

f. Actuators must have manual override to allow positioning of the valve.

g. Actuators must have selectable valve sequencing and flow curves of either equal percentage or linear.

h. Actuators must have feedback.

i. Actuators must have internal torque protection throughout stroke.

j. Actuator operating temperature is 14…122°F (-10…50°C) for chilled water applications, 14…113°F (-10…45°C) up to a maximum valve fluid temperature of 281°F (138°C), 14…107°F (-10…42°C) up to a maximum valve fluid temperature of 300°F (149°C), 14…100°F (-10…38°C) up to a maximum valve fluid temperature of 340°F (171°C), 14…90°F (-10…32°C) up to a maximum valve fluid temperature of 366°F (186°C).

k. Actuator agency listings (North America) UL873, cULus, RCM, CE

l. Basis of Design: Schneider Electric Forta M400A-VB, M800A-VB, M900A and M1500x-VB screw mounted on Venta VB7000s, or approved equal.

8. 2 ½" to 6" Cast Iron Flanged Globe Valve Linear Actuators with linkage

a. Actuators are to be either floating SPDT control or proportional control 0…10, 2…10 Vdc or 4…20 mA with a 500-ohm resistor included.

b. Actuators are to direct/reverse acting with selectable DIP switch.

c. Actuators are to have 180 lb. (800N) or 337 lb. (1500N) of force.

d. Actuators will need a 24 Vac or Vdc power supply.

e. Actuators are to be rated NEMA 2, vertical mount only.

f. Actuators must have manual override to allow positioning of the valve.

g. Actuators must have selectable valve sequencing and flow curves of either equal percentage to linear. A 2…10 Vac feedback.

h. Actuators must have Internal torque protection throughout stroke.

i. Actuator operating temperature is 14…122°F (-10…50°C) for chilled water applications, 14…113°F (-10…45°C) up to a maximum valve fluid temperature of 281°F (138°C), 14…107°F (-10…42°C) up to a maximum valve fluid temperature of 300°F (149°C).

j. Actuator agency listings (North America) UL873, cULus, RCM, CE

k. Basis of Design: Schneider Electric Forta M800A and M1500A, or approved equal.

9. 2-½" to 6" Cast Iron Flanged Globe Valve Actuators/220 lbs. force.

a. Actuators must have Two- Position for a SPST controller, Floating for a SPST controller, and Proportional models will a controller input signal of either a 0…10 Vdc, 2…10 Vdc, 4…20 mAdc, or 6…9 Vdc. Control function direct/reverse action is jumper selectable.

b. Actuator is to be spring return.

c. Actuator will have 220 lb. force (979 newton) with ½" (13 mm) or 1" (25 mm) nominal linear stroke.

d. Feedback on proportional model with 2…10 Vdc (max. 0.5 mA) output signal or to operate up to four like additional slave actuators.

e. Actuator must automatically set input span to match valve travel.

f. Actuator Operating temperature 0…140°F (-18…60°C) up to a maximum valve fluid temperature of 300°F (149°C).

g. Actuator is to have a 24 Vac power supply on Two-position and Proportional models and 120 Vac on Two-position models.

h. Actuator housings rated for up to NEMA 2/IP54.

i. Actuator must have manual override to allow positioning of valve and preload.

j. Actuator is to mount directly to vales without separate linkage.

k. Actuator agency Listings: UL 873, CUL: UL.

l. Basis of Design: Schneider Electric SmartX Mx61-720x, or approved equal.

10. 2-½" to 6" Cast Iron Flanged Globe Valve Actuators with linkage SR.

a. Actuators with 60, 133, or 150 lb.-in of force depending on model.

b. Actuator housings rated for up to NEMA 2/ IP54 with a 150 lb.-in. rated a NEMA 4.

c. Actuators are to be spring return.

d. Actuators are to have Two-position, Floating and Proportional models.

e. Actuators must have overload protection throughout rotation.

f. Actuator have an optional built-in auxiliary switch to provide for interfacing or signaling on selected models.

g. Actuator agency listings: UL-873, C22-2 No.24-83, CUL0.

h. Basis of Design: Schneider Electric SmartX, or approved equal.

11. 2” to 18” 2-Way and 2” to 16” 3-Way Linear Butterfly Valve Actuator with linkage NSR

a. The butterfly valve actuators are to be Non-Spring Return (NSR) two-position and proportional taking 0…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 4, manual override (hand wheel) two auxiliary switches, and built-in heater.

b. Actuator close-offs and CVs must be appropriate for the valve size in a typical HVAC application.

c. Actuators must be available in 24 Vac and 120 Vac models.

d. Actuators must have Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.

e. Proportional models must have feedback of 0…10 Vdc or 4…20 mA.

f. Actuator operating temperature shall be -40…150°F (-40…60°C).

g. Actuator agency listings (North America) UL, CSA and CE

h. Basis of Design: Schneider Electric S70, or approved equal.

12. 2” to 4” 2-Way and 3-Way Butterfly Valve Actuators SR

a. The butterfly valve actuators are to be Spring Return (SR) two-position and proportional taking 2…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 2.

b. Actuator close-offs and CVs must be appropriate for the valve size in a typical HVAC application.

c. Actuators must be available in 24 Vac models.

d. Actuators shall have two SPDT auxiliary switch models.

e. Actuators must have [Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.

f. Proportional models must have feedback of 2…10 Vdc or 4…20 mA.

g. Actuator operating temperature shall be -22…140°F (-12…60°C).

h. Actuator agency listings (North America) UL, CSA and CE

i. Basis of Design: Schneider Electric SmartX Mx-41-7153, or approved equal.

13. 2” to 6” 2-Way and 3-Way Butterfly Valve Actuators NSR

a. The butterfly valve actuators are to be Non-Spring Return (NSR) two-position and proportional taking 0…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 2.

b. Actuator close-offs and CVs must be appropriate for the valve size in a typical HVAC application.

c. Actuators must be available in 24 Vac models.

d. Actuators shall have two SPDT auxiliary switch models.

e. Actuators must have [Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.

f. Proportional models must have feedback of 2…10 Vdc or 4…20 mA.

g. Actuator operating temperature shall be -4…122°F (-2…50°C).

h. Actuator agency listings (North America) UL, CSA and CE

i. Basis of Design: Schneider Electric SmartX NR-22xx-5xx, or approved equal.

R. Dampers

1. Automatic dampers, furnished by the Building Automation Contractor shall be single or multiple blade as required. Dampers are to be installed by the HVAC Contractor under the supervision of the BAS system supplier. All blank-off plates and conversions necessary to install smaller than duct size dampers are the responsibility of the Sheet Metal Contractor.

2. Damper frames are to be constructed of 13 gauge galvanized sheet steel mechanically joined with linkage concealed in the side channel to eliminate noise as friction. Compressible spring stainless steel side seals and acetyl or bronze bearings shall also be provided.

3. Damper blade width shall not exceed eight inches. Seals and 3/8 inch square steel zinc plated pins are required. Blade rotation is to be parallel or opposed as shown on the schedules.

4. For high performance applications, control dampers will meet or exceed the UL Class I leakage rating.

5. Control and smoke dampers shall be Ruskin, or approved equal.

6. Provide opposed blade dampers for modulating applications and parallel blade for two position control.

S. Damper Actuators

1. Direct-coupled type non-hydraulic designed for minimum 100,000 full-stroke cycles at rated torque.

2. Direct-coupled damper actuators must have a five-year warrantee.

3. Size for torque required for damper seal at maximum design conditions and valve close-off pressure for system design.

4. Direct-coupled damper actuators should accommodate 3/8", ½" 1.05" round or 3/8"…½" and ¾" square damper shafts.

5. Actuator operating temperature minimum requirements: 44, 88 and 133 lb.-in. are –25°F…130°F (–32°C…55°C). The 30, 35, 60, 150 and 300 lb.-in. are -25°…140°F (-30°C… 60 °C). The 270 are -22°…122°F (-30°C… 50 °C).

6. Overload protected electronically throughout rotation except for selected Floating actuators the have a mechanical clutch.

7. Spring Return Actuators: Mechanical fail safe shall incorporate a spring-return mechanism.

8. Non-Spring Return Actuators shall stay in the position last commended by the controller with an external manual gear release to allow positioning when not powered.
9. Power Requirements: 24Vac/dc [120Vac][230Vac]
10. Proportional Actuators controller input range from 0…10 Vdc, 2…10 Vdc or 4…20 mA models.
11. Housing: Minimum requirement NEMA type 2 with NEMA type 4 available for applications requiring higher ratings.
12. Actuators with a microprocessor should not be able to be modified by an outside source (cracked or hacked).
13. Actuators of 133 and 270 lb.-in. of torque or more should be able to be tandem mount or "gang" mount.
14. Agency Listings: ISO 9001, cULus, CE and CSA
15. Basis of Design: Schneider Electric SmartX Actuators, or approved equal.

T. Smoke Detectors
1. Air duct smoke detectors shall be by Air Products & Controls or approved equal. The detectors shall operate at air velocities from 300 feet per minute to 4000 feet per minute.
2. The smoke detector shall utilize a photoelectric detector head.
3. The housing shall permit mechanical installation without removal of the detector cover.
4. The detectors shall be listed by Underwriters Laboratories and meet the requirements of UL 268A.

U. Airflow Measuring Stations
1. Provide a thermal anemometer using instrument grade self heated thermistor sensors with thermistor temperature sensors.
2. The flow station shall operate over a range of 0 to 5,000 feet/min with an accuracy of +/- 2% over 500 feet/min and +/- 10 ft/min for reading less than 500 feet/min.

2.8 ELECTRICAL POWER MEASUREMENT

A. Electrical Power Monitors, Single Point (Easy Install):
1. Acceptable Manufacturer: Schneider Electric, Veris Industries.
2. General: Consist of three split-core CTs, factory calibrated as a system, hinged at both axes with the electronics embedded inside the master CT. The transducer shall measure true (rms.RMS) power demand real power (kW) consumption (kWh). Conform to ANSI C12.1 metering accuracy standards.
3. Voltage Input: Load capacity as shown on drawings. 208-480 VAC, 60 Hz
4. Maximum Current Input: Up to 2400A
5. Performance:
   a. Accuracy: +/- 1% system from 10% to 100% of the rated current of the CT's

b. Operating Temperature Range: 32-140°F, 122°F for 2400A.

6. Output: 4 to 20 mA, Pulse. or Modbus RTU
7. Ratings:
   a. Agency: UL508 or equivalent
   b. Transducer internally isolated to 2000 VAC.
   c. Case isolation shall be 600 VAC.
8. Basis of Design: Similar to Enercept H80xx Series, E23 Series
9. Accessories: Current transducers (CTs): split-core (E681/H681/U004) series, solid-core (E682/U004 series) and Rogowski Coils – rope style (E683 series); Communications gateways: Modbus to Ethernet (EGX150)

B. Electrical Power Monitors, Single Point (High Accuracy):
1. Acceptable Manufacturer: Schneider Electric, Veris Industries.
2. General: Revenue grade meter. Measures voltage, amperage, real power (kW), consumption (kWh), and reactive power (kVARar), and power factor (PF) per phase and total load for a single load. Factory calibrated as a system using split core CT's. Neutral voltage connection is required.
3. Voltage Input: 208-480 VAC, 60 Hz
4. Current Input: Up to 2400A
5. Performance:
   a. Accuracy: +/- 1% system from 2% to 100% of the rated current of the CT's
   b. Operating Temperature Range: 32-122°F
6. Output: Pulse, BACnet, Modbus RTU
7. Display: Backlit LCD
8. Enclosure: NEMA 1
9. Agency Rating: UL508 or equivalent
10. Basis of Design: Veris Industries H81xx00 series.
11. Accessories: Current transducers (CTs): split-core (E681/H681/U004) series, solid-core (E682/U004 series)

C. Electrical Power Monitors, Single Point (High Accuracy/Versatility):
1. Acceptable Manufacturer: Schneider Electric, Veris Industries.
2. General: Revenue grade meter. Measures voltage, amperage, real power (kW), consumption (kWh), reactive power (kVAR), apparent power (kVA) and power factor (PF) per phase and total load for a single load. Available with data logging , Bi-directional (4-quadrant) metering, and pulse contact accumulator inputs.
3. Voltage Input: 90-600 VAC, 50/60 Hz, 125-300 VDC
4. Current Input: 5A – 32,000A, selectable 1/3V or 1V CT inputs
5. Performance:
   a. Accuracy shall be +/- [0.2%][0.5%] revenue grade
   b. Operating Temperature Range: -22-158°F

6. Output shall be [Pulse][BACnet][Modbus RTU][LON][Modbus TCP][BACnet/IP][Modbus RTU/TCP][SNMP]
7. Display: Backlit LCD
8. Enclosure: NEMA 4x optional
9. Agency Rating: UL508, ANSI C12.20
10. Basis of Design: Veris E50 series, Veris E60 Series or Schneider Electric PM5000 Series
11. Accessories: Current transducers (CTs): split-core (E681/H681/U004) series, solid-core (E682/U004 series) and Rogowski Coils – rope style (E683 series)

D. Electrical Power Monitors, Multiple Point (92 loads, High Accuracy):
1. Acceptable Manufacturer: Schneider Electric, Veris Industries.
2. General: Revenue grade meter. Measures volts, amps, power and energy for each circuit. 1/4 amp to 200 amp monitoring. 4 configurable alarm threshold registers
3. Voltage Input: 90-277 VAC, 60 Hz
4. Current Input: 5A – 32,000A, 1/3V CT inputs
5. Performance:
   a. Accuracy: +/- 0.5% meter (split core), +/- 1% system from 1/4-100A (solid core)
   b. Operating Temperature Range: 32-140°F
6. Output: [BACnet][Modbus RTU][ModbusTCP][BACnet/IP][Modbus RTU/TCP][SNMP]
7. Agency Rating: UL508, ANSI C12.10, IEC Class 1
8. Basis of Design: Veris E3xxx series.

PART 3 - EXECUTION

3.1 GENERAL

A. In addition to the requirements specified herein, execution shall be in accordance with the requirements of Specification Section 23 00 00 and Drawings.

B. Examine equipment exterior and interior prior to installation. Report any damage and do not install any equipment that is structurally, moisture, or mildew damaged.

C. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

D. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

E. Install equipment in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

F. Provide final protection and maintain conditions in a manner acceptable to the manufacturer that shall help ensure that the equipment is without damage at time of Substantial Completion.

G. Demolition

1. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit, and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be disposed of by the Contractor.

H. Access to Site

1. Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner's Representative.

I. Code Compliance

1. All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations. Should any discrepancy be found between wiring specifications in Division 17 and Division 16, wiring requirements of Division 17 will prevail for work specified in Division 17.

J. Cleanup

1. At the completion of the work, all equipment pertinent to this contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this contract.

3.2 SYSTEM ACCEPTANCE TESTING

A. All application software will be verified and compared against the sequences of operation.

B. Control loops will be exercised by inducing a setpoint shift of at least 10% and observing whether the system successfully returns the process variable to setpoint. Record all test results and attach to the Test Results Sheet.

C. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the owner.

D. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the owner.

E. Perform an operational test of each third party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

3.3 INSTALLATION

A. Hardware Installation Practices for Wiring

1. All controllers are to be mounted vertically and per the manufacturer's installation documentation.
2. The 120VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. This circuit will not feed any other circuit or device.
3. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.
4. Wires are to be attached to the building proper at regular intervals such that wiring does not droop. Wires are not to be affixed to or supported by pipes, conduit, etc.
5. Conduit in finished areas will be concealed in ceiling cavity spaces, plenums, furred spaces and wall construction. Exception; metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.
6. Conduit, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.
7. Wires are to be kept a minimum of three (3) inches from hot water, steam, or condensate piping.
8. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.
9. Wire will not be allowed to run across telephone equipment areas.
10. Provide fire caulking at all rated penetrations.

B. Installation Practices for Field Devices

1. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.
2. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.

3. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.
4. Water line mounted sensors shall be removable without shutting down the system in which they are installed.
5. For duct static pressure sensors, the high pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low pressure port shall be left open to the plenum area at the point that the high pressure port is tapped into the ductwork.
6. For building static pressure sensors, the high pressure port shall be inserted into the space via a metal tube. Pipe the low pressure port to the outside of the building.

C. Wiring, Conduit, and Cable
1. All wire will be copper and meet the minimum wire size and insulation class listed below:
   a. Power - 12 Gauge - 600 Volt
   b. Class One - 14 Gauge Std. - 600 Volt
   c. Class Two - 18 Gauge Std. - 300 Volt
   d. Class Three - 18 Gauge Std. - 300 Volt
   e. Communications - Per Mfr.
2. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.
3. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.
4. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Set screw fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.
5. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.
6. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.
7. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire management system shall be in conduit.

8. Fiber optic cable shall include the following sizes; 50/125, 62.5/125 or 100/140.
9. Only glass fiber is acceptable, no plastic.
10. Fiber optic cable shall only be installed and terminated by an experienced contractor. The BAS system supplier shall submit to the Engineer the name of the intended contractor of the fiber optic cable with his submittal documents.

D. Enclosures
1. For all I/O requiring field interface devices, these devices where practical will be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure which protects the device(s) from dust, moisture, conceals integral wiring and moving parts.
2. FIPs shall contain power supplies for sensors, interface relays and contactors, and safety circuits.
3. The FIP enclosure shall be of steel construction with baked enamel finish; NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for twenty percent spare mounting space. All locks will be keyed identically.
4. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.
5. All outside mounted enclosures shall meet the NEMA-4 rating.
6. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

E. Identification
1. Identify all control wires with labeling tape or sleeves using words, letters, or numbers that can be exactly cross-referenced with as-built drawings.
2. All field enclosures, other than controllers, shall be identified with a Bakelite nameplate. The lettering shall be in white against a black or blue background.
3. Junction box covers will be marked to indicate that they are a part of the BAS system.
4. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with name plates.
5. All I/O field devices inside FIP's shall be labeled.

F. Existing Controls.
1. Existing controls which are to be reused must each be tested and calibrated for proper operation. Existing controls which are to be reused and are found to be defective requiring replacement, will be noted to the Owner. The Owner will be responsible for all material and labor costs associated with their repair.

G. Location

1. The location of sensors is per mechanical and architectural drawings.
2. Space humidity or temperature sensors will be mounted away from machinery generating heat, direct light and diffuser air streams.
3. Outdoor air sensors will be mounted on the north building face directly in the outside air. Install these sensors such that the effects of heat radiated from the building or sunlight is minimized.
4. Field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.

H. Software Installation

1. The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software or other third party software necessary for successful operation of the system.

3.4 TRAINING

A. The BAS system supplier shall provide both on-site and classroom training to the Owner's representative and maintenance personnel per the following description:

B. On-site training shall consist of a minimum of (20) hours of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include

1. System Overview
2. System Software and Operation
3. System access
4. Software features overview
5. Changing setpoints and other attributes
6. Scheduling
7. Editing programmed variables
8. Displaying color graphics
9. Running reports
10. Workstation maintenance
11. Viewing application programming
12. Operational sequences including start-up, shutdown, adjusting and balancing.
13. Equipment maintenance

C. C.Factory, classroom training will include a minimum of (2) training reservations for a 3 day course with material covering workstation operation tuition free with travel expense responsibility of the owner. The option for 2-3 weeks of system engineering and controller programming shall be possible if necessary and desired.

3.5 CONTROL SYSTEM SWITCH-OVER

A. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.

B. Switch-over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over.

C. The Contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame.

3.6 DATABASE CONFIGURATION.

A. The Contractor will provide all labor to configure those portions of the database that are required by the points list and sequence of operation.

3.7 COLOR GRAPHIC DISPLAYS.

A. Unless otherwise directed by the owner, the Contractor will provide color graphic displays as depicted in the mechanical drawings for each system and floor plan. For each system or floor plan, the display shall contain the associated points identified in the point list and allow for setpoint changes as required by the owner.

3.8 REPORTS.

A. The Contractor will configure a minimum of 4 reports for the owner. These reports shall, at a minimum, be able to provide:

1. Trend comparison data
2. Alarm status and prevalence information
3. Energy Consumption data
4. System user data

3.9 POINT TO POINT CHECKOUT.

A. Each I/O device (both field mounted as well as those located in FIPs) shall be inspected and verified for proper installation and functionality. A checkout sheet itemizing each device shall be filled out, dated and approved by the Project Manager for submission to the owner or owner’s representative.

B. In case of wireless devices, the signal strength recorded during checkout shall be reported.

3.10 CONTROLLER AND WORKSTATION CHECKOUT.

A. A field checkout of all controllers and front end equipment (computers, printers, modems, etc.) shall be conducted to verify proper operation of both hardware and software. A checkout sheet itemizing each device and a description of the associated tests

shall be prepared and submitted to the owner or owner's representative by the completion of the project.

3.11 DOCUMENTATION

A. As built software documentation will include the following:

1. Descriptive point lists
2. Application program listing
3. Application programs with comments.
4. Printouts of all reports.
5. Alarm list.
6. Printouts of all graphics
7. Commissioning and System Startup
8. An electronic copy of all databases, configuration files, or any type of files created specifically for each system.

END OF SECTION 23 09 23

DIVISION 23 - MECHANICAL

SECTION 23 09 93 – SEQUENCE OF OPERATIONSGENERAL

A. Unit Ventilators (Occupancy based DCV)

a. The units shall be controlled by Schneider Electric room mounted sensors to maintain occupied and unoccupied space temperature set points. The sensor will have no adjustment – all setpoint adjustments will be made at the DDC front-end. A discharge air sensor (8' averaging capillary), mixed air temperature sensor and controller are to be installed for each unit. A Schneider Electric Advanced application controller shall be provided for control of these units.

b. The DDC front-end will index the unit between occupied and unoccupied cycles. Whenever the unit's supply fan is off, the outside air damper shall be fully closed.

c. The units shall be tied into the building's DDC control system for occupied/unoccupied cycle operation. All setpoints will be adjustable from the front-end.

d. Optimal Start: An adaptive optimal start algorithm shall be used to enable the unit with the outside air damper closed and heating enabled to warm-up the space prior to occupancy time, necessary to achieve zone occupied temperature setpoints by the start of scheduled occupied period. The learning adaptive algorithm shall compare the zone temperature to its setpoint at beginning of scheduled occupied period and shall automatically adapt the heating response time for the next unoccupied period. The maximum warm-up start time will be adjustable at the DDC front-end. At no later than the scheduled occupancy time, the unit will transition to occupied mode sequence as indicated below, with the outside air damper modulating open to 20% of minimum code required ventilation position to provide minimum required DCV volumetric flow of outside air (adjustable).

e. Pre-Occupancy Purge: Thirty minutes prior to the scheduled occupancy time of the unit, the unit will be indexed to a pre-occupancy cycle. This cycle shall run the unit supply / exhaust fans for 30 minutes with the outdoor air / return air / spill air dampers positioned as required to allow for the code required ventilation rate at maximum occupancy. Once the fan is proven running, the outdoor air damper will modulate open, the heating valve will be under the control of the low limit discharge sensor, maintaining discharge air at 60 deg. (adjustable).

f. Post Occupancy Purge: When the unit is indexed into the unoccupied mode as dictated by the occupancy schedule programmed into the BMS, the unit will run in a post occupancy flush cycle. The outdoor air, return air & exhaust / spill air dampers shall be positioned to provide 100% quantity of outdoor air required for full occupancy of the space, with all fans running until the space CO2 levels reach outdoor air ambient conditions. When indoor air CO2 levels are equal to outdoor air CO2 levels, the unit will shut down, entering the unoccupied cycle.

g. Freezestat: A freezestat shall be provided, draped across the full face of the coils in order to detect a freezing condition. Upon an initial trip at T1 = 40 deg. F., the heating valve will open fully & the outdoor air damper will close. An alarm will be sent to the BMS front end. This action will automatically reset once the internal unit temperature has risen. Upon a hard trip at T2 = 38 deg. F., the unit fans will be shut down, the heating valve will open fully

and the outdoor air damper will close. This will be a manual reset condition. An alarm will be sent to the BMS front end.

h. Damper Control: The unit economizer dampers will be controlled to maintain CO2 levels based upon a room occupancy sensor for demand controlled ventilation. Once the supply fan has been proven running, the outdoor air damper will move to 20% of the minimum code required ventilation rate. When the space occupancy sensor detects room occupancy, the unit ventilator outdoor air damper will open to at least the minimum code required ventilation position. The outdoor air damper will be allowed to modulate open beyond that required for demand controlled ventilation if free cooling is available, and required to maintain indoor temperature setpoint.

i. Occupied Period: During the occupied period, the supply fan will run continuously and indicate to the DDC controller via a current relay wired to a binary input of the controller that the fan is running. Once the fan is proven running, the outside air damper shall modulate to 20% of minimum code required ventilation rate. Whenever occupancy is sensed, outdoor air damper will modulate to the full minimum code required ventilation rate / damper position. Whenever the space temperature is below the space set point of 68°F (adjustable), the heating valve(s) will be cycled to maintain the discharge air temperature at the discharge heating setpoint. The discharge air setpoint shall reset automatically between the discharge high limit of 100°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. As the space temperature rises above the space set point (adjustable), the outside air damper shall modulate open beyond their minimum position, up to 100% to maintain the cooling space setpoint. The controller's program will maintain a minimum discharge and mixed air temperature of 60°F (adjustable) by enabling the heating and modulating the outside air damper, beyond the minimum position, in sequence without overlap).

j. Occupied Period – Cooling Mode: The front-end will determine the heating and cooling modes of the unit based on the outdoor air temperature/free cooling availability. If the space is on a call for cooling and there is no free cooling available and the supply fan is proven running, the outdoor air damper will move to 20% of the minimum open position (no occupancy) or the minimum outdoor air position (occupancy, adjustable from the front-end) and the DDC controller will cycle the stages of DX cooling / cycle the chilled water valve to maintain the space cooling set point. If the economizer dampers fail to satisfy the cooling demand and the space temperature is above setpoint, the economizer dampers will modulate to minimum position as previously described and the stages of mechanical cooling / cycling of chilled water valve will be enabled to maintain cooling temperature setpoint.

l. During the unoccupied cycle, the unit's supply fan shall be cycled to maintain space setback temperature set point of 55 deg. F. (adjustable). The heating valve will be modulated to maintain the night heating setpoint. The outside air dampers shall be closed.

m. All outside air dampers shall fail in the closed position.

A. <u>New Face & Bypass Unit Ventilators, Hot Water / DX Cooling</u>

a. The units shall be controlled by Andover room mounted sensors to maintain occupied and unoccupied space temperature set points. A discharge air sensor (8' averaging capillary), space temperature sensor and unitary controller are to be installed for each unit.

b. The units will be provided with a factory installed freeze-stat. This is to be left in place to shut the fan off when a freezing condition occurs. Whenever the fan is off, the outside air damper will be closed. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5°

higher than the set point of the factory freeze-stat. If such a condition occurs, the outside air damper will close, the fan will shut off and an alarm will be displayed on the front-end and an email will be sent from the DDC front-end system to those recipients designated by the District. The alarm and email messages will indicate which unit caused the alarm and be stamped with the date and time that the alarm occurred.

c. The units shall be tied into the building's Andover DDC control system for occupied/unoccupied cycle operation. All setpoints will be adjustable from the front-end.

d. Occupied Period: During the occupied period, the supply fan will run continuously and indicate to the DDC controller via a current relay wired to a binary input of the controller that the fan is running. Once the fan is proven running, the outside air damper shall modulate open to minimum position (adjustable), to provide the minimum required volumetric flow rate of outside air. Whenever the space temperature is below the space set point of 68°F (adjustable), the face & bypass damper will be fully open to the heating coil to maintain the discharge air temperature at the discharge heating setpoint. The discharge air setpoint shall reset automatically between the discharge high limit of 120°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. As the space temperature rises above the space set point (adjustable), the face & bypass damper will fully face the bypass and the outside air damper shall modulate open beyond their minimum position to maintain the cooling space setpoint. The controller's program will maintain a minimum discharge temperature of 60°F (adjustable) by modulating the F&B damper and modulating the outside air damper, beyond the minimum position required volumetric flow rate of outside air, in sequence without overlap.

e. Occupied Period – Cooling Mode (For units with CHW cooling): The FX front-end will determine the heating and cooling modes of the unit based on the outdoor air temperature/free cooling availability. When indexed into mechanical cooling mode, the supply fan will run and indicate to the DDC controller via a current relay wired to a binary input of the controller that the fan is running. The outdoor air damper will be at its minimum position (adjustable from the front-end). The DDC controller will modulate the face/bypass damper to maintain the space cooling set point.

f. During the unoccupied cycle the unit's supply fan shall be cycled to maintain space setback temperature set point. The face/bypass damper will fully face the coil. The outside air damper shall be closed. There will be no cooling operation during the unoccupied mode.

g. The outside air damper shall fail in the closed position.

h. For any new units that have existing, or new auxiliary finned tube radiation as shown on the plans, a dedicated control signal from the DDC controller will cycle a new auxiliary radiation control valve (provided by ATC contractor and installed by Mechanical Contractor) to maintain the space setpoint. A lower setpoint will be maintained during the unoccupied cycle. For hot water applications, the ftr control valve will be 2-position. For steam applications, the ftr control valve will be modulating control, temperature rated for steam.

Dynamic Color Graphics Requirements

a. The color graphics that the user will see to operate the system shall be resident in the front-end. The main graphic shall be a three-dimensional floor plan of the building with links to each room and its HVAC system. The display will provide links to all DDC equipment in the building. Links to data trends and schedules shall be located on each system's graphic screen.

b. The minimum point information that is to be mapped to the front-end panel and shown in the color graphic screens is as follows:

Unit Ventilators				
Description	**Point**	**History**	**Alarm**	**Totalize**
Damper Command	AO	X		
Discharge Air Temperature	AI	X	X	
Discharge Low Limit Set Point	AV	X		
F&B damper	AO	X		
Minimum Outdoor Air Damper Position (adjustable)	AV	X		
Occupied Command	BV			
Occupied Space Set Point	AV	X		
Occupied Status	BV	X		
Outside Air Temperature	AI	X		
Space Temperature	AI	X	X	
Status of DDC controller	BV		X	
Supply Fan Command	BO	X	X	
Supply Fan Status	BI	X	X	X
Unoccupied Space Set Point	AV	X		
Working Setpoint	AV	X		

G. <u>Split AC Units (VRF Systems)</u>

a. The VRF systems will operate under standalone factory controls.

b. The ATC contractor will install and wire the factory furnished wall thermostat and will provide the low voltage interlock control wiring to the condensing unit.

c. Provide an interlock between the new VRF cooling equipment & the existing heating & ventilating equipment (where applicable) such that there can be no simultaneous heating & cooling operation and that during winter heating, only economizer cooling can be used in the event that the space exceeds it's heating setpoint. Heating and cooling setpoints shall maintain a 5 deg. F. minimum offset.

d. Provide interface to the Schneider BMS and provide graphics to show each space, with all setpoints, H&V unit status, VRF indoor unit status, outdoor VRF unit status, & status of interlocks.

e. Additionally, the Split AC units will be provided with factory provided BACnet communication cards and/or gateway controllers. Programming and startup of the Split AC unit BACnet cards/gateway controllers will be provided by the Split AC Unit manufacturer. The ATC contractor will provide the communication wiring between these units and the front-end. All DDC points on these BACnet cards will be seamlessly mapped to the DDC front-end, with setpoints adjustable from the BMS front-end. The ATC contractor will include all BACnet licenses, hardware, programming, software necessary for the expanded front-end to accomplish this.

f. An individual graphic shall be provided for each unit. For multiple Splits units serving a common space, a common graphic will be provided controlling the equipment

in the room with common sequenced heating and cooling setpoints. Additional graphics will be provided for each individual unit.

g. The VRF condensing unit will be networked to the BMS front-end via a factory BACnet MSTP card. The ATC contractor will include the wiring, addressing and integration of the VRF BACnet points to the BMS front-end.

Dynamic Color Graphics Requirements

c. The color graphics that the user will see to operate the system shall be resident in the Andover front-end. The main graphic shall be a three-dimensional floor plan of the building with links to each room and its HVAC system. The display will provide links to all DDC equipment in the building. Links to data trends and schedules shall be located on each system's graphic screen.

d. The minimum point information that is to be mapped to the front-end panel and shown in the color graphic screens is as follows:

Split AC Units				
Description	**Point**	**History**	**Alarm**	**Totalize**
Integrated DDC Points		X	X	X
Occupied Command	BV	X		
Status of DDC controller	BV		X	

VRF Condensing Unit				
Description	**Point**	**History**	**Alarm**	**Totalize**
Integrated points of factory VRF controller (BACnet)	AV/BV	X	X	
Status of DDC controller	BV		X	

H. Air Handling Units

Temperature controls for the new air handling units for the Main Office Suite area and the Lobby area shall meet the following sequence of operation:

1. Heating Mode – Unoccupied: During the unoccupied mode, the unit shall remain off, with the outdoor air damper fully closed. A low limit thermostat installed in the unit will allow flow through the heating coil if temperatures below 40 deg. F. (adjustable) are sensed within the unit.
2. Heating Mode, Occupied: During the occupied mode, the unit shall start, the unit shall open the outdoor air damper to it's minimum code required ventilation position, maintaining code required ventilation rates and the unit shall modulate the heating coil control valve as required to maintain neutral air discharge (+/-62 deg. F., adjustable). The unit main / return fans VFD will run. The unit will run in this fashion for the entirety of the occupied cycle. The unit shall be equipped with a freezestat covering the entire face of the coil. If a freezing condition occurs, the unit shall close the outdoor air damper, shut the fan down and send an alarm to the BMS. Note that the room thermostat shall modulate the existing fin tube radiator control valve within the room as required to perform the remainder of the heating for each room.

3. Cooling Mode, Unoccupied: During the unoccupied mode, mechanical cooling shall be locked out and the unit shall remain off, with the outdoor air damper fully closed.

4. Cooling Mode, Occupied: During the cooling occupied mode, the outdoor air dampers shall modulate to the open position required for code required ventilation. Outdoor air / economizer will act as stage 1 cooling. Should temperature / humidity conditions of the outdoor air be insufficient to meet discharge air setpoint, mechanical cooling will be enabled. Mechanical cooling will be cycled as required to maintain a 78 deg. F. / 60% RH discharge air setpoint, adjustable. Provide discharge air temperature sensors. Provide a discharge air humidity sensor so that the unit may operate in a "dehumidification (reheat via existing heating coil) mode if desired by the owner. Note that the classroom (or Office) VRF cassette will be modulated by it's related thermostat as required to perform the remainder of the cooling requirement.

   All fans shall be proven running when commanded to do so and shall show status at the head end graphic.

   Damper & valve actuators shall be mapped up to show their actual position at the head end.

   All coils shall show inlet water temperature and discharge water temperature at the head end graphic.

   All units shall read discharge air temperature, return air temperature and mixed air temperature at the graphic.

   All unit alarms (temperature / freezestat / fan fault / etc.) shall be transmitted to the head end graphic for that unit and shall also be transmitted to the main alarm page at the BMS.

I. Exhaust Fans

a. The ATC contractor shall supply and install all required DDC controllers, controls and required hardware to allow the following sequences of operation to occur.

b. The exhaust fan will run continuously during the occupied mode and be off during the unoccupied mode based on schedule resident in the BMS front-end. Fan status will be monitored at the BMS.

Dynamic Color Graphics Requirements

The color graphics that the user will see to operate the system shall be resident in the Andover web-based front-end controller. PC-based systems are not acceptable. The main graphic shall be a three-dimensional floor plan of the building with links to each room and its HVAC system. The display will provide links to all DDC equipment in the building. Links to data trends and schedules shall be located on each system's graphic screen. The minimum point information that is to be mapped to the front-end panel and shown in the color graphic screens is as follows:

Air Handling Units / Unit Ventilators				
Description	**Point**	**History**	**Alarm**	**Totalize**
Discharge Air Temperature	AI	X	X	

Mixed Air Temperature	AI	X	X	
Unit discharge RH	AI	X	X	
Unit discharge RH setpoint	AV	X		
Pre-Occupancy Purge Command	AV	X		
Pre-Occupancy Purge Max Runtime Allowed	AV	X		
Post-Flush Command	AV	X		
Post-Flush Max Runtime Allowed	AV	X		
Space Temperature	AI	X	X	
Space Relative Humidity	AI	X	X	
Outside Air Temperature	AV	X		
Occupied Space Temperature Heating Set Point	AV	X		
Occupied Space Temperature Cooling Set Point	AV	X		
Occupied Space Relative Humidity Set Point	AV	X		
Unoccupied Space Temperature Heating Set Point	AV	X		
Unoccupied Space Temperature Cooling Set Point	AV	X		
Active Temperature Setpoint	AV	X		
Active Relative Humidity Setpoint	AV	X		
Mixed Air Low Limit Set Point	AV	X		
Discharge Air Low Limit Set Point	AV	X		
Heating Command	AO	X		
Cooling Command	BO	X		
Outside Air Damper Command	AO	X		
Exhaust Air Damper Command	AO	X		
Return Air Damper Command	AO	X		
Dehumidification/Hot Gas Reheat Command	AO	X		
Supply Fan Status	BI	X	X	X
Supply Fan Command	BO	X	X	
Exhaust Fan Status	BI	X	X	X
Exhaust Fan Command	BO	X	X	
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Exhaust Fans				
Description	**Point**	**History**	**Alarm**	**Totalize**
Fan Command	BO	X	X	
Fan Status	BI	X		
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Hot Water Hydronic Cabinet Heaters with No Fresh Air

A. Hot Water Cabinet Heater (CH-Tags) Unit (Heating)
   1. General
      a. The Contractor shall provide, install, wire the following: Johnson F4-CGM controller, TE-6314P-1 wall temperature sensor, TE-6315P-1 (8' averaging discharge air sensor), current relay wired to monitor the supply fan, fail-safe, normally closed outside air damper actuator, fail-safe, normally open, modulating heating control valve.
      b. Occupied/unoccupied cycle determination will be made via the BMS front-end.
      c. All setpoints will be adjustable from the BMS front-end.
      d. Dedicated Outdoor Air System (DOAS) serving this space shall be running to provide tempered fresh air to space. Refer to DOAS sequence of operations in this specification for further details.
   2. Occupied Hours
      a. During occupied hours, the CH-Tags shall be enabled:
         i. The supply fan shall run continuously.
         ii. CH-Tags Supply fan shall be enabled.
         iii. New DDC modulating glycol hot water control valve shall modulate the supply air discharge temperature based on a new DDC room thermostat (72 F adjust). Whenever the space temperature is below the space set point of (adjustable), the heating valve will be open to maintain the discharge air temperature at the discharge heating setpoint. The discharge air setpoint shall reset automatically between the discharge high limit of 100°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. As the space temperature rises above the space set point (adjustable), the glycol hot water control valve shall modulate & slowly close until the space temperature setpoint is met.
      b. In the event that CH-Tags has a command to enable either the supply air fan, modulating hot water control

valve, return air damper positions and is still disabled, an alarm will be displayed on the BMS.

c. Heating shall be enabled when outside air temperature is 65 deg F (adj) and space cooling unit shall be locked out.

3. Unoccupied Hours
    a. During unoccupied hours, the CH-Tags shall be enabled:
        i. Supply fan shall be enabled.
        ii. Return air damper shall be 100% open.
        iii. New DDC modulating glycol hot water control valve shall modulate the supply air discharge temperature based on a new DDC room thermostat (60 F adjust)
    b. In the event that CH-Tags has a command to enable either the supply air fan, modulating glycol hot water control valve & return damper positions and is still disabled, an alarm will be displayed on the BMS.

HOT WATER CABINET UNIT HEATERS SEQUENCE OF OPERATIONS:

A. Hot Water Cabinet Unit Heater (CUH-Tags) Unit (Heating)
    1. General
        a. The Contractor shall provide, install, wire the following: Schneider controller, wall temperature sensor, 8' averaging discharge air sensor, current relay wired to monitor the supply fan, fail-safe, normally closed outside air damper actuator, fail-safe, normally open, modulating heating control valve.
        b. Occupied/unoccupied cycle determination will be made via the BMS front-end.
        c. All setpoints will be adjustable from the BMS front-end.
        d. Heating-Ventilation (H-V) unit serving this space shall be running to provide tempered fresh air to space. Refer to H-V Unit sequence of operations in this specification for further details.
    2. Occupied Hours
        a. During occupied hours, the CUH shall be enabled:
            i. The supply fan shall run continuously.
            ii. CUH Supply fan shall be enabled.

iii. New DDC modulating hot water control valve shall modulate the supply air discharge temperature based on a new DDC room thermostat (72 F adjust). Whenever the space temperature is below the space set point of (adjustable), the heating valve will be open to maintain the discharge air temperature at the discharge heating setpoint. The discharge air setpoint shall reset automatically between the discharge high limit of 100°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. As the space temperature rises above the space set point (adjustable), the glycol hot water control valve shall modulate & slowly close until the space temperature setpoint is met.

b. In the event that CUH has a command to enable either the supply air fan, modulating hot water control valve and is still disabled, an alarm will be displayed on the BMS.

c. Heating shall be enabled when outside air temperature is 65 deg F (adj) and space cooling unit (if applicable) shall be locked out.

3. Unoccupied Hours
   a. During unoccupied hours during heating season, the CUH shall be enabled:
      i. Supply fan shall be enabled.
      ii. New DDC modulating glycol hot water control valve shall modulate the supply air discharge temperature based on a new DDC room thermostat (60 F adjust)
   b. In the event that CUH has a command to enable either the supply air fan, modulating glycol hot water control valve and is still disabled, an alarm will be displayed on the BMS.

DEDICATED OUT AIR SYSTEMS (DOAS) SEQUENCE OF OPERATIONS:

Notes:

A. AHU-1 has an electric duct coil (EHC-1)

1. General
    a. The Contractor shall provide, install, wire the following for each DOAS unit: Schneider controller, return air temperature and RH sensor, (8’ averaging discharge air sensor), (8’ averaging mixed air sensor), current relay wired to monitor the supply fan, fail-safe, normally closed outside air damper actuator, fail-safe, normally open, modulating heating control valve.
    b. The ATC contractor will provide and install a freeze-stat, wired to shut of the supply and exhaust fan in all positions of the H-O-A switch. Manual reset of the freezestat is required. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5° higher than the set point of the freeze-stat. If such a condition occurs, the outside air damper shall close, the fans will shut down, the heating valve shall open, and an alarm generated at the DDC front-end.
    c. Whenever the unit’s supply fan is off, the outside air damper shall be fully closed.
    d. Occupied/unoccupied cycle determination will be made via the BMS front-end.
    e. All setpoints will be adjustable from the BMS front-end.
2. Occupied Hours (Cooling Mode)
    f. During occupied hours, DOAS unit shall be enabled:
        i. The supply and exhaust fans shall run continuously.
        ii. Once the supply fan is proven running, the Outside air damper shall open to minimum outside air position and the Return air damper shall open to a percentage based on (100% open – Minimum Outside Air Damper Position %)
        iii. DX Cooling stage(s) shall be enabled. Unit shall modulate supply air discharge dry bulb & wet bulb air temperature to maintain 70 deg F (dry bulb-adj.) and 60 deg F (wet bulb-adj.) to send into supply air ductwork.

g. In the event that DOAS has a command to enable either the supply air fan, exhaust/relief air fan, return & outside air damper positions, DX cooling stage(s) and is still disabled, an alarm will be displayed on the BMS.

3. Unoccupied Hours (Cooling Mode)
    h. During unoccupied hours, AHU-1 shall be disabled with outside air damper position & relief air damper position at 0% open.
4. Occupied Hours (Heating Mode)
    i. During occupied hours, RTU shall be enabled:
        i. Outside air damper shall open to 100% fully open position.
        ii. Relief/Exhaust air damper shall open to 100% fully open position.
        iii. Upon proof of dampers opening, Supply fan & Exhaust/Relief Fan shall both be enabled.
    j. New Hot Water Coil (AHU-1)
        i. New DDC modulating control valve shall modulate to maintain the supply air discharge temperature set point (68 F adjustable).
    k. In the event that unit has a command to enable either the supply air fan, modulating control valve, return & outside air damper positions, new modulating hot water control valve is still disabled, or freeze stat trips on hot water coil, an alarm will be displayed on the BMS.
5. Unoccupied Hours (Heating Mode)
    l. During unoccupied hours, AHU-1 shall be off and hw heating valve shall be closed. Upon a call for heat at the unoccupied heating set point:
        i. Supply fan blower shall be enabled.
        ii. Outside air damper shall be at 0% open (Recirculation Mode).
        iii. Return air damper shall be 100% open
        iv. DDC modulating control valve shall modulate open to maintain the heating set point.
    m. In the event that AHU-1 has a command to enable either the supply air fan, return & outside air damper positions, new modulating hot water control valve is still disabled, or freeze stat trips on hot water duct coil, an alarm will be displayed on the BMS.
        i. DDC modulating control valve shall modulate open to maintain the heating set point.

n. In the event that AHU-1 has a command to enable either the supply air fan, modulating hot water control valve, return & outside air damper positions, new modulating hot water control valve is still disabled, or freeze stat trips on hot water duct coil, an alarm will be displayed on the BMS.

HOT WATER PERIMETER FIN TUBES SEQUENCE OF OPERATIONS:

A. Hot Water Perimeter Fin Tube Unit (Heating)
   1. General
      a. The Contractor shall provide, install, wire the following: Schneuder controller, wall temperature sensor, fail-safe, normally open, modulating heating control valve.
      b. Occupied/unoccupied cycle determination will be made via the BMS front-end.
      c. All setpoints will be adjustable from the BMS front-end.
      d. Heating-Ventilation (H-V) or Dedicated Outdoor Air System (DOAS) unit serving this space shall be running to provide tempered fresh air to space. Refer to H-V Unit or DOAS Unit sequence of operations in this specification for further details.
   2. Occupied Hours
      a. During occupied hours, the FT shall be enabled:
         i. New DDC modulating hot water control valve shall modulate the water flow for the perimeter finned tube based on a new DDC room thermostat (72 F adjust). Whenever the space temperature is below the space set point of (adjustable), the heating valve will be open to maintain the room temperature heating setpoint. As the space temperature rises above the space set point (adjustable), the hot water control valve shall modulate & slowly close until the space temperature setpoint is met.
      b. In the event that the FT modulating hot water control valve has a command to open and is still disabled, an alarm will be displayed on the BMS.
      c. Heating shall be enabled when outside air temperature is 64 deg F (adj) and space cooling unit (if applicable) shall be locked out.
   3. Unoccupied Hours

a. During unoccupied hours during heating season, the FT shall be disabled. FT shall become enabled if the spoace temperature drops below the night setback temperature setting.
b. In the event that FT has a command to enable modulating glycol hot water control valve and is still disabled, an alarm will be displayed on the BMS.

EXHAUST FAN SEQUENCE OF OPERATIONS:

A. General
    a. Fan shall be in the “enabled” position during occupied hours.
    b. Occupied hours shall be adjusted on BMS schedule menu (adj.).
    c. All setpoints will be adjustable from the BMS front-end.
B. Occupied Hours
    a. During occupied hours, EF Unit shall be enabled.
        i. Exhaust Fan shall run continuously.
C. Unoccupied Hours
    b. During unoccupied hours, EF Unit shall be disabled.
D. Interlocks
    a. New unit for Main Office area relief air shall be interlocked with the exhaust fan system serving that area.
    b. Sequence: Upon proof of motorized exhaust dampers opening, outside damper shall open to full. Main Office exhaust fan shall all energize.

H&V Units / Cabinet Heaters / Fin Tube Elements				
Description	**Point**	**History**	**Alarm**	**Totalize**
Discharge Air Temperature	AI	X	X	
Mixed Air Temperature	AI	X	X	
Space Temperature	AI	X	X	
Outside Air Temperature	AV	X		
Occupied Space Temperature Heating Set Point	AV	X		
Occupied Space Temperature Cooling Set Point	AV	X		
Unoccupied Space Temperature Heating Set Point	AV	X		
Unoccupied Space Temperature Cooling Set Point	AV	X		
Active Temperature Setpoint	AV	X		
Mixed Air Low Limit Set Point	AV	X		
Heating Command	AO	X		
Cooling Command	BO	X		

Outside Air Damper Command	AO	X		
Exhaust Air Damper Command	AO	X		
Return Air Damper Command	AO	X		
Dehumidification/Hot Gas Reheat Command	AO	X		
Supply Fan Status	BI	X	X	X
Supply Fan Command	BO	X	X	
Exhaust Fan Status	BI	X	X	X
Exhaust Fan Command	BO	X	X	
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

END OF SECTION 23 09 23

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 232113 – HYDRONIC PIPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of hot and / or chilled water piping systems work is indicated on drawings and schedules, and by requirements of this section.

B. Applications for hot/chilled water piping systems include the following:

1. Hot/chilled water piping systems for hot/chilled water heating/cooling terminal units.

2. Hot/chilled water piping systems for hot/chilled water coils in air handling units.

C. Refer to appropriate Division 23 sections for insulation required in connection with hot/chilled water piping systems.

1.03 QUALITY ASSURANCE

A. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of hot/chilled water piping systems.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data for hot/chilled water piping systems, materials and products.

B. Shop Drawings: Submit scaled layout drawings of installed hot/chilled water pipe and fittings including, but not necessarily limited to, pipe sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between piping and proximate equipment.

PART 2 - PRODUCTS

2.01 HOT/CHILLED WATER PIPING MATERIALS AND PRODUCTS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings and capacities as indicated. Where not indicated, provide proper selection as determined by engineer to comply with installation requirements.

B. Provide materials and products complying with ANSI B31.1 Code for Power Piping where applicable, base pressure rating on hot/chilled water piping systems maximum design pressures. Provide sizes and types matching piping and equipment materials used in hot/chilled water piping systems. Where more than one type of material or product is indicated, selection is engineer’s option.

2.02 BASIC IDENTIFICATION

A. General: Provide identification complying with Division 23 Basic Materials and Methods section "Mechanical Identification."

2.03 BASIC PIPE, TUBE AND FITTINGS

A. General: Provide pipe, tube and fittings complying with Division 15 Basic Materials and Methods section "Pipe, Tube and Fittings," in accordance with the following listing:

1. Hot/chilled water AND low pressure steam piping:

    a. Pipe size 2" and smaller: Black steel pipe.

        1) Pipe weight: Schedule 40.
        2) Fittings: Class 125 cast iron threaded.

2. Pipe size 2-1/2" and larger: Black steel pipe.

        1) Pipe weight: Schedule 40.
        2) Fittings: Wrought steel buttwelding.

2.04 BASIC PIPING SPECIALTIES

A. General: Provide piping specialties complying with Division 23 Basic Materials and Methods section "Piping Specialties."

2.05 BASIC SUPPORTS, ANCHORS AND SEALS

A. General: Provide supports, anchors and seals complying with Division 23 Basic Material and Methods section "Supports, Anchors, and Seals." Supports and anchors provided shall meet the requirements of section 1613 of the New York State Building Code; horizontal and vertical runs of pipe shall be securely supported in accordance with the New York State Building Code including seismic requirements.

2.06 BASIC VALVES

A. General: Provide valves complying with Division 23 Basic Materials and Methods section "Valves," in accordance with the following listings:

1. Sectional Valves:

    a. 2" and smaller: Ball valves (hot/chilled water only).
    b. 2-1/2” and larger: rising stem or O.S.&Y. type.
    c. 2-1/2: and larger: Butterfly valves

2. Shutoff Valves:

    a. 2" and smaller: Ball valves (hot/chilled water only)
    b. 2-1/2" and larger: Rising stem or O.S.&Y. valves. Butterfly valves may be used.

3. Heating/Cooling Terminal Outlet Valves:

    a. 2" and smaller: Balance valve (Globe type)(hot/chilled water only)
    b. 2-1/2" and larger: Rising Stem.(Globe type).

4. Drain Valves:

    a. 2" and smaller: Ball valves.

5. Check Valves:

    a. All sizes: Silent wafer type check valve, swing type check valve.

2.07 BASIC EXPANSION COMPENSATION

A. General: Provide expansion compensation products complying with Division 23 "Expansion Compensation," in accordance with the following listing:

1. Flexible ball pipe joints (hot/chilled water only) Use fabricated piping loops for low pressure steam or linear bellows type rated for steam service.
2. Pipe alignment guides and anchors.

2.08 BASIC THERMOMETERS AND GAUGES

A. General: Provide meters and gauges complying with Division 23 section "Thermometers and Gauges," in accordance with the following listing:

1. Temperature gauges and fittings.
2. Pressure gauges and fittings.
3. Flow measuring gauges.

2.09 HYDRONIC SPECIALTIES

A. General: Provide hydronic specialties complying with Division 23 section "Hydronic Specialties," in accordance with the following listing:

1. Balance valves.
2. Balance cocks.
3. Vent valves.
4. Flow control valves.
5. Diverting fittings.
6. Air separators.

2.10 UNDERGROUND PIPING

A. General:

1. All underground heating water lines shall be XTRU-THERM as manufactured by PERMA-PIPE. All straight sections shall be factory fabricated, insulated, and jacketed. The piping system design and manufacture shall be in strict conformance with ASME B31.1, latest edition. The piping manufacturer will be responsible for the design and thermal expansion of the system. Installation of the piping system shall be in accordance with the manufacturer’s instructions. Factory trained field technical assistance shall be provided for critical periods of installation, unloading, field joint instruction and testing.

B. Service Pipe:

1. The service pipe shall be ASTM A53 Schedule 40 Grade B Carbon Steel. Straight sections shall be supplied in 20 or 40-foot lengths with piping exposed at each end for field joint fabrication.

C. Insulation:

1. The service pipe insulation shall be polyurethane foam with 2 lb/ft^3 minimum density, 90% minimum closed cell content, minimum compressive strength of 40 psi and initial thermal conductivity of 0.18 Btu-in/hr/ft^2/^{O}F. The insulation shall completely fill the annular space between the service pipe and jacket and-shall be bonded to both. Systems using open cell insulation or a non- bonded design shall not be allowed. The polyurethane foam insulation shall be tested by the manufacturer for mechanical and thermal s to assure compliance with the above values. All test samples will be taken from production material, identified, tagged and tested in accordance with the table below. Test reports showing results will be furnished to the engineer for approval. Data supplied by the polyurethane foam chemical supplier is not acceptable.

Attribute	ASTM STD	Sample Frequency	Requirement
Insulation Density	D 1622	Once per shift	$\geq$ 2 lb/ft^3
Insulation Compression Strength	D 1621	Once per shift	$\geq$ 40 psi
Insulation Closed Cell Content	D 2856	Once per shift	$\geq$ 90%
Insulation Thermal Conductivity	C 518	Once per shift	< 0.18 Btu-in/hr/ft^2/°F

The insulation shall be provided to the minimum thickness specified below:

Pipe Size (in.)	Minimum Insulation Thickness (in.)	
	Chilled Water	Glycol Water
1 to 12	1.5	1.5

D. Insulation Jacket:

1. The outer protective insulation jacket shall be seamless high-density polyethylene (HDPE) in accordance with ASTM D3350, minimum cell classification PE345444C. PVC or tape materials are not allowed. The end of each straight section of pipe will have the jacket tapered down over the insulation and bonded to the service pipe. No mastic is allowed. The minimum thickness of the HDPE jacket shall be as follows:

Jacket OD (in.)	Minimum Jacket Thickness (in.)
OD < 12	0.120

E. Fittings:

1. All fittings shall be factory prefabricated and pre-insulated. Straight tangent lengths shall be added to all ends so that all field joints are at straight sections of pipe. Elbow jackets shall be molded HDPE. Tee jackets shall be extrusion welded or butt fusion welded HDPE. Gluing, taping or hot air welding shall not be allowed.

F. Field Joints:

1. The service pipe shall be hydrostatically tested to 150 psig or 1 1/2 times the design pressures whichever is greater. Insulation shall then be poured in place into the field joint area. All field-applied insulation shall be placed only in straight sections of pipe. The installer shall seal the field joint area with a heat shrinkable adhesive backed sleeve. Backfilling shall not begin until the heat shrink sleeve has cooled. All insulation and jacketing materials for the field joint shall be furnished by PERMA-PIPE.

G. Field Service:

1. The piping manufacturer will provide a factory field service technician to be present during critical periods of the installation. The factory field service technician will be employed by the piping manufacturer and will not be a sales representative.

H. Backfill:

1. A 4-inch layer of sand or fine gravel shall be placed and tamped in the trench to provide a uniform bedding for the pipe. The entire trench width shall be evenly backfilled with a similar material as the bedding in 6 inch compacted layers to a minimum height of 6 inches above the top of the insulated pipe. The remaining trench shall be evenly and continuously backfilled and compacted in uniform layers with suitable excavated soil.

PART 3 - EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION

A. General: Install mechanical identification in accordance with Division 23 Basic Materials and Methods section "Mechanical Identification."

3.02 INSTALLATION OF HOT/CHILLED WATER WATER DISTRIBUTION PIPING

A. General: Install water distribution piping in accordance with Division 23 Basic Materials and Methods section "Pipe, Tube and Fittings."

B. Install concentric reducers where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush.

C. Install piping with 1" minimum rise in 40' pipe run (0.2%) in direction of flow.

D. Connect branch feed piping to mains at horizontal center line of mains, connect run-out piping to branches at horizontal center line of branches.

E. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.03 INSTALLATION OF PIPING SPECIALTIES

A. Install piping specialties in accordance with Division 23 section "Hydronic Specialties."

3.04 INSTALLATION OF SUPPORTS, ANCHORS AND SEALS

A. Install supports, anchors and seals in accordance with Division 15 Basic Materials and Methods and project drawings and details.

3.05 INSTALLATION OF VALVES

A. Install valves in accordance with Division 23 section "Valves."

B. Sectional valves: Install on each branch and riser, close to main, where branch or riser serves two or more heating terminals or equipment connections and elsewhere as indicated.

C. Shutoff valves: Install on inlet and outlet of each mechanical equipment item and on inlet of each heating/cooling terminal and elsewhere as indicated.

D. Heating/cooling terminal outlet valves: Install on outlet of each heating/cooling terminal and elsewhere as indicated.

E. Drain valves: Install on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system and elsewhere where indicated or required to completely drain hot/chilled water piping system.

F. Check valves: Install on discharge side of each pump and elsewhere as indicated.

3.06 INSTALLATION OF EXPANSION COMPENSATION PRODUCTS

A. Install expansion compensation products in accordance with Division 23 section "Expansion Compensation."

3.07 INSTALLATION OF THERMOMETERS AND GAUGES

A. Install thermometers and gauges in accordance with Division 23 section "Thermometers and Gauges."

3.08 INSTALLATION OF HYDRONIC SPECIALTIES

A. General: Install hydronic specialties in accordance with Division 23 "Hydronic Specialties" section.

3.09 EQUIPMENT CONNECTIONS

A. General: Connect hot/chilled water piping system to mechanical equipment as indicated and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return, drain valve on drain connection.

B. Hot/chilled water terminals: Install hot/chilled water terminals with heating/cooling terminal outlet valve and union on outlet, union, shutoff valve on inlet. Install automatic air vent valve on element in accordance with manufacturer's instructions. Locate valves and balancing cocks behind valve access doors for ease of maintenance. Where indicated, install automatic temperature control valve with unions between all ports of the control valve.

3.10 CLEANING, FLUSHING AND INSPECTING

A. General: Include coils, etc. See Division 23 Basic Materials & Methods.

3.11 TESTING AND BALANCING

A. General: See Division 23 "Testing, Adjusting and Balancing.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 232116 – HYDRONIC SPECIALTIES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of hydronic specialties required by this section is indicated on drawings, and/or specified in other Division 23 hydronic piping system sections.

B. Types of hydronic specialties specified in this section include the following:

1. Balance valves.
2. Vent valves.
3. Flow control valves.
4. Diverting fittings.
5. Air separators.
6. Compression tanks.
7. Pump discharge valves.
8. Shot feeders.
9. Water relief valves.
10. Pressure reducing valves.
11. RPZ – Backflow Preventer

1.03 QUALITY ASSURANCE

A. Materials and equipment shall be provided by one of the manufactures listed in Part 2 - Products. Materials and equipment from other manufacturers may be accepted if proven equal to those specified. This contractor is liable for and shall pay for all architectural and engineering review and redesign costs for substitute materials and equipment. This contractor also is liable for all costs of changes in the work required by substitute equipment.

B. The length of time the manufacturer has been in business, the location and capability of complete repair facilities, availability of repair parts and annual maintenance contracts all will be considered in determining equality. Refer to requirements pertaining to substitute materials and equipment.

1.04 SUBMITTALS

A. Product data - submit catalog cuts, specifications, installation instructions and dimensioned drawings for each type of manufactured hydronic specialty. Include pressure drop curve or chart for each type and size of hydronic specialty.

B. Shop drawings - submit for fabricated specialties, indicating details of fabrication, materials and method of support.

C. Maintenance data - submit maintenance data and spare parts lists for each type of manufactured hydronic specialty. Include this data in maintenance manual.

D. Hydronic specialty types - provide hydronic specialties of same type by same manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURED HYDRONIC SPECIALTIES

A. General - provide factory fabricated hydronic specialties recommended by manufacturer for use in service indicated. Provide hydronic specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by the engineer to comply with installation requirements. Provide sizes as indicated and connections which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is the engineers' option, but more than one type cannot be used on project.

B. Balance valves:

1. General - provide balance valves as indicated, of one of the following types:

   a. Threaded ends 2" and smaller - Class 125, bronze body, ball valve with memory stop.
   b. Soldered ends 2" and smaller - Class 125, bronze body, ball valve with memory stop.
   c. Threaded, soldered, of flanged end globe style providing three (3) functions:

      1) Precise flow measurement
      2) Precision flow balancing
      3) Positive shut-off, no drip seat, Teflon disk, 1-1/2" to 2" size - drain connection with protective cap.
      4) Vernier-type setting with "hidden memory" feature to program valve for tamper-proof setting. Balance meter, valved connections. Manufacturer: Armstrong Pumps, Type CBV.

C. Vent valves:

1. Manual vent valves - provide manual vent valves designed to be operated manually with screwdriver or thumbscrew, 1/8" N.P.T. connection.

2. Automatic vent valves - provide automatic vent valves designed to vent automatically with float principle, stainless steel float and mechanisms, cast iron body, pressure rated for 125 psi, 1/2" N.P.T. inlet and outlet connections.

3. Manufacturer - subject to compliance with requirements, provide vent valves of one of the following:

   a. Bell & Gossett, ITT Fluid Handling Div.
   b. Taco, Inc.
   c. Armstrong Co.

D. Flow control valves:

1. General - provide flow control valves pressure rated for 125 psi, containing lift check assembly which will automatically open by means of pump flow pressure, and automatically close when pump is not operating. Provide with means to manually open in case of pump failure.

   a. Threaded ends 2" and smaller - cast iron body, bronze check mechanism, screw-in bonnet, straight or angle pattern.
   b. Soldered ends 1 1/4" and smaller - cast bronze body, bronze check mechanism, screw in bonnet, straight or angle pattern.
   c. Threaded ends 2 1/2" through 4" - cast iron body, bronze check mechanism, screw in bonnet, straight or angle pattern.

2. Manufacturer - subject to compliance with requirements, provide flow control valves of one of the following:

    a. Bell & Gossett, ITT Fluid Handling Div.
    b. Taco, Inc.
    c. Armstrong Pump Co.

E. Diverting fittings:

1. General - provide diverting fittings as indicated for one pipe hydronic piping systems. Construct fittings of cast iron with threaded ends or wrought copper with solder ends, pressure rated for 125 psi. Provide indication on fitting of direction of flow for supply or return applications. Furnish flow and pressure drop curves based on manufacturer's testing with submittal.

2. Manufacturer - subject to compliance with requirements, provide diverting fittings of one of the following:

    a. Armstrong Pumps, Inc.
    b. Bell & Gossett, ITT Fluid Handling Div.

F. Air Separators:

1. General – provide air separators pressure rated for 125 psi. Select capacity based on total system gpm.

2. Dip tube fittings – provide dip tube fittings in boilers as indicated to prevent free air collected in boiler from rising into system.

3. In-Line air separators – provide in-line air separators as indicated. Construct sizes 1 1/2” and smaller of cast iron, and sizes 2” and larger of steel complying with ASME Boiler and Pressure Vessel Code and stamped with” U” symbol. Furnish National board Form U-1 denoting compliance.

4. Combination separator/strainer – provide external combination air separators/strainers as indicated. Construct of steel complying with ASME Boiler and Pressure Vessel Code and stamped with “U” symbol. Furnish National Board Form U-1 denoting compliance. Provide galvanized steel integral strainer with 3/16” perforations and free area of not less than 5 times cross sectional area of connecting lines. Provide tangential inlet and outlet connections and internal stainless steel air collector tube designed to direct released air into compression tank. Provide blowdown connections.

5. Manufacturer – subject to compliance with requirements, provide air separators of one of the following:

    a. Armstrong Pumps, Inc.
    b. Bell & Gosett, ITT Fluid Handling Div.
    c. Taco, Inc.

G. Compression tank:

1. General – provide compression tanks of size and number as indicated. Construct of steel for 125 psi pressure rating complying with ASME Boiler and pressure Vessel Code and stamped with” U” symbol. Furnish National Board Form U-1 denoting compliance. Provide tappings in bottom of tank for tank fitting.

a. Tank fittings – provide tank fittings for compression tanks as indicated, sized for compression tank diameter. Design tank fittings for 125 psi pressure rating and include manual vent to establish proper air volume in tank on initial fill.

2. Manufacturer – subject to compliance with requirements, provide compression tanks and tank fittings of one of the following:

   a. Armstrong Pumps, Inc.
   b. Bell & Gossett, ITT Fluid Handling Div.
   c. Taco, Inc.

H. Diaphragm type compression tanks:

1. General – provide diaphragm compression tanks of size and number as indicated. Construct tank of welded steel, constructed, tested and stamped in accordance with Section VII of the ASME Boiler and Pressure Vessel Code for a working pressure of 125 psi. Furnish National Board Form U-1 denoting compliance. Support vertical tanks with steel legs or base, support horizontal tanks with steel saddles. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity. Provide pressure gauge and air charging fitting.

2. Manufacturer – subject to compliance with requirements, provide diaphragm type compression tanks of the following:

   a. Bell & Gossett, ITT Fluid Handling Div.
   b. Armstrong Pumps, Inc.

I. Pump discharge valves:

1. General – provide pump discharge valves as indicated. Provide Non-slam check valve with spring loaded disc and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Provide flanged cast iron valve body, pressure rated for 175 psi, maximum operating temperature of 300 degrees F. Provide straight or angle pattern as required.

2. Manufacturer – subject to compliance with requirements, provide Pump discharge valves of one of the following:

   a. Armstrong Pumps, Inc.
   b. Bell & Gossett, ITT Fluid Handling Div.

J. Shot feeders:

1. General – provide shot feeders of 5 gallon capacity or otherwise as indicated, constructed of cast iron or steel, for introducing chemicals in hydronic system. Provide funnel and valve on top for loading drain valve in bottom, and recirculating valves on side. Construct for pressure rating of 125 psi.

2. Manufacturer – subject to compliance with requirements, provide shot feeders of one of the following:

   a. Culligan USA
   b. Laboratories, Subsidiary of Clow Corp.
   c. Mougul Div., The Dexter Corp.

K. Water relief valves:

1. General – provide water relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

   a. Combined pressure temperature relief valves – bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F (99 C) and pressure relief as indicated on drawing.
   b. Pressure relief valves – bronze body, test lever, ASME rated. Provide pressure relief at as indicated on drawing.

2. Manufacturer – subject to compliance with requirements, provide water relief valves of one of the following:

   a. Bell & Gossett, ITT Fluid Handling Div.
   b. Taco, Inc.
   c. Armstrong Pump Co.

L. Pressure Reducing Valves:

1. General – provide pressure reducing valves as indicated, of size and capacity as selected by Installer to maintain operating pressure on boiler system.

2. Construction – brass body, low inlet pressure check valve, inlet strainer removable without system shutdown, non-corrosive valve seat and stem, factory set at operating pressure.

3. Manufacturer – subject to compliance with requirements, provide pressure reducing valves of one of the following:

   a. Bell & Gossett, ITT Fluid Handling Div.
   b. Taco, Inc.
   c. Armstrong Pumps, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Balance valves:

1. General - Install on each hydronic terminal and elsewhere as indicated.

B. Vent valves:

1. Manual vent valves - install manual vent valves on each hydronic terminal at highest point, and on each hydronic piping drop in direction of low for mains, branches and runouts and elsewhere as indicated.

2. Automatic vent valves - install automatic vent valves at top of each hydronic riser and elsewhere as indicated. Install shutoff valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.

C. Flow control valves:

1. General - install flow control valves on discharge of each pump serving a hot water heating system or zone and elsewhere as indicated. Install in upright position in a horizontal line with adequate clearance for service and replacement. Adjust flow sensitivity for automatic operation.

D. Diverting fittings:

1. General - install diverting fittings as indicated and in accordance with manufacturer's instructions. Position fittings on supply and return mains with proper orientation for flow.

E. Air separators:

1. Dip tube fittings – install dip tube fittings in boiler outlet in accordance with manufacturer's instructions. Run piping to compression tank pitched towards tank at 1" rise in 5' runs (1.7%).

2. In-Line air separators – install in-line air separators in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank pitched towards tank at 1" rise in 5' run (1.7%). Install drain valve on units 2" and over.

3. Combination separator/strainer – install external combination separators/strainers in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank pitched towards tank at 1" rise in 5' run (1.7%). Install blowdown valve and piping. Remove and clean strainer after 24 hours and again after 30 days of system operation.

F. Compression tanks:

1. General – install compression tanks on trapeze hangers sized for tank fully loaded, or otherwise as indicated. Install tank fitting and drain valve in tank bottom and charge tank in accordance with manufacturer's instructions.

G. Diaphragm type compression tanks:

1. General – install diaphragm type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.

H. Pump discharge valves:

1. General – at engineers option, install pump discharge valves on each pump discharge line in lieu of separate shutoff valve, check valve, and balance cock. Install in horizontal or vertical position with stem in upward position, allow clearance above stem for check mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balanced position.

I. Shot feeders:

1. General – install shot feeders on each hydronic system at pump discharge and elsewhere as indicated. Install in upright position with top of funnel not more than 48" above floor. Install in pump discharge line as indicated.

J. Water relief valves:

1. General – Install on hot water generators and elsewhere as indicated. Pipe discharge to floor. Comply with ASME Boiler and Pressure Vessel Code. Cut discharge pipe at 45° angle.

K. Pressure reducing valves:

1. Install for each hot water boiler or heat exchanger as indicated, and in accordance with manufacturer's installation instructions.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 232123 – HYDRONIC PUMPS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contractor, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Pumps required by this section is indicated on drawings and/or specified in other Division 23 sections.

B. Pumps specified in this section include the following:

1. In-Line Booster.
2. In-Line Circulator.
3. Vertical In-Line.
4. Frame-Mounted End Suction.
5. Close-Coupled End Suction.

C. Refer to appropriate Division 23 section for motor starters, disconnects and wiring of pump motors, not work of this section.

D. Refer to appropriate Division 23 sections for valves, gauges, strainers, vibration isolation bases, flexible pipe connectors for pumps, not work of this section.

1.03 QUALITY ASSURANCE

A. Materials and equipment shall be provided by one of the manufacturers listed in Part 2 - Products. Materials and equipment from other manufacturers may be accepted if proven equal to those specified. This contractor is liable for and shall pay for all architectural and engineering review and redesign costs for substitute materials and equipment. This contractor is also liable for all costs of changes in the work required by substitute equipment.

B. The length of time the manufacturer has been in business, the location and capability of complete repair facilities, availability of repair parts and annual maintenance contracts all will be considered in determining equality.

C. Refer to Division 01 of the project manual for requirements pertaining to substitute materials and equipment.

D. UL and NEMA Compliance - provide electric motors and products which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's pump specifications, installation and start-up instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.

B. Maintenance Data: Submit maintenance data and spare parts lists for each type of pump. Include this data in maintenance manual.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle HVAC pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged HVAC pumps or components; replace with new.

B. Store HVAC pumps and components in clean, dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide factory tested pumps, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. Type, size and capacity of each pump is listed in pump schedule. Provide pumps of same type by same manufacturer.

2.02 IN-LINE BOOSTER PUMPS

A. General: Provide in-line booster pumps where indicated, of capacities scheduled.

B. Type: Horizontal, oil-lubricated, designed for 125 psi working pressure, 225 degrees F (107 degrees C) continuous water temperature, and specifically designed for quiet operation.

C. Body: Cast-iron.

D. Shaft: Steel, ground and polished, integral thrust collar.

E. Bearings: Two horizontal sleeve bearings designed to circulate oil.

F. Seal: Mechanical, with carbon seal face rotating against ceramic seat.

G. Motor: Open, drip-proof, sleeve bearings, quiet operating, rubber mounted construction, built-in thermal overload protection.

H. Coupling: Self-aligning, flexible coupling.

I. Manufacturer: One of the following:

1. Taco
2. Armstrong Pumps, Inc.
3. Bell & Gossett ITT.

2.03 IN LINE CIRCULATOR PUMPS

A. General: Provide in-line circulator pumps where indicated, of capacities scheduled.

B. Type: Horizontal mount, vertical split case, oil-lubricated, designed for 125 psi working pressure, and 225 degree F (107 degree C) continuous water temperature.

C. Body: Cast iron, bronze fitted with suction and discharge gauge tappings.

D. Shaft: Hardened alloy steel.

E. Bearings: Oil-lubricated bronze journal bearings.

F. Seal: Mechanical, with carbon seal ring and ceramic seat.

G. Motor: Non-overloading at any point on pump curve, open, drip-proof oil-lubricated journal bearings, resilient mounted construction, built-in thermal overload protection on single phase motors.

H. Coupling: Self-aligning, flexible coupling.

I. Impeller: Enclosed type, hydraulically and dynamically balanced, and keyed to shaft.

J. Manufacturer: One of the following:

1. Taco
2. Armstrong Pumps, Inc.
3. Bell & Gossett ITT.

2.04 VERTICAL IN-LINE PUMPS

A. General: Provide vertical in-line pumps where indicated, of capacities scheduled.

B. Type: Vertical mount, in-line, close coupled, single stage, designed for 175 psi working pressure.

C. Body: Cast iron bronze fitted, 125 psi ANSI flanges of equal size, tappings for gauge and drain fittings.

D. Shaft: Steel with replaceable shaft sleeve.

E. Seal: Mechanical seal with ceramic seal seat.

F. Motor: Non-overloading at any point on pump curve, open, drip-proof, ball bearings, 15,000 hours bearing life, with lifting lug on top of motor.

G. Impeller: Enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.

H. Manufacturer: One of the following:

1. Taco
2. Armstrong Pumps, Inc.
3. Bell & Gossett ITT.

2.05 FRAME MOUNTED END SUCTION PUMPS

A. General: Provide frame-mounted end suction pumps where indicated, of capacities, characteristics scheduled.

B. Type: Horizontal mount, single stage, vertical split case, flexible coupling, base mounted, designed for 175 psi working pressure.

C. Casing: Cast iron, bronze fitted, 125 psi ANSI flanges, tappings for gauge and drain connections.

D. Shaft: Steel with replaceable shaft sleeve.

E. Bearings: Regreasable ball bearings.

F. Seal: Mechanical, with carbon seal ring and ceramic seat.

G. Motor: Open, drip-proof, regreasable ball bearings.

H. Impeller: Enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.

I. Baseplate: Structural steel with welded cross members, and open grouting area.

J. Coupling: Flexible, capable of absorbing torsional vibration, equipped with coupling guard.

K. Manufacturer: One of the following:

1. Taco
2. Armstrong Pumps, Inc.
3. Bell & Gossett ITT.

2.06 CLOSE-COUPLED END SUCTION PUMPS

A. General: Provide close-coupled end suction pumps where indicated, of capacities and characteristics scheduled.

B. Type: Horizontal mount, single stage, vertical split case, designed for 175 psi working pressure.

C. Casing: Cast iron, bronze fitted, 125 psi ANSI flanges, tappings for gage and drain connections.

D. Shaft: Steel with replaceable shaft sleeve.

E. Seal: Mechanical, with carbon seal ring and ceramic seat.

F. Motor: Open, drip-proof regreasable ball bearings.

G. Impeller: Enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.

H. Manufacturer: One of the following:

1. Amtrol Inc., Thrush Div.
2. Armstrong Pumps, Inc.
3. Bell & Gossett ITT.

PART 3 - EXECUTION

3.01 INSTALLATION OF PUMPS

A. Install pumps where indicated, in accordance with manufacturer's published installation instructions, with recommended clearances provided for service and maintenance.

B. Install in-line pumps, supported from piping system, located for access to oil cups, service, and maintenance.

C. Install base-mounted pumps on minimum of 4" high (or as shown) reinforced concrete base equal or greater than 3 times total weight of pump and motor, with anchor bolts poured in place. Set and level pump, grout under pump base with non-shrink grout.

D. Provide piping accessories, hangers, supports, and anchors, valves, meters and gauges, vibration isolation, and equipment supports, as indicated for complete installation.

E. Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer, and in presence of manufacturer's service representative.

F. Lubricate pumps before start-up. Start-up in accordance with manufacturer's instructions.

G. Ensure that pump units are wired properly, with rotation in correct direction, and that pump and motor grounding have been provided.

H. Refer to Division 23 section "HVAC Testing and Balancing" for pump system balancing.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233000 – AIR DISTRIBUTION

PART 1 – GENERAL

1.01 GENERAL

A. Construct all apparatus of materials suitable for the conditions encountered during operation.

B. Where corrosion can occur, appropriate corrosion-resistant materials and assembly methods must be used including isolation of dissimilar metals against galvanic interaction.

C. All factory applied acoustical and thermal insulation, including facing and adhesives, it to be fire-resistant and to conform to requirements of NBFU and State Codes.

D. Where in contact with the air stream, protect insulation against erosion or flaking by a factory applied plastic or mat facing.

E. Locate and arrange motors, eliminators, filters, cooling and heating coils, and other components and accessories so that they are accessible for repair, maintenance, and replacement.

F. Mount grease fitting directly on bearings unless the latter are not readily accessible. Where equipment bearings are not visible or are inaccessible, provide easily accessible extensions to bearing lubrication fittings.

G. Thoroughly clean the entire system before installing filters or operating the fans.

H. On systems containing filters, install filters and permanently seal the filter frames airtight before operating the fans. The Contractor, at his own expense, shall replace all dirty filters before turning over the system to the Owner, and furnish the Owner with one complete set of replacement filters for all banks. Seal all outlets around the edges to prevent air leakage.

I. Bracing and supports indicated are the minimum acceptable. Install additional bracing or supports to eliminate any distortion or vibration when the systems are operating or under tests.

J. Install ducts, castings, and hangers plumb and level, with joints square and devoid of sharp edges.

K. Unless otherwise specified, construct all duct work, including angles, bars, and other bracings, hangers, supports, and accessories of galvanized steel, all in accordance with schedules in the latest ASHRAE Guide.

L. Diffusers, grilles, registers, and transfers shall be sized and located as shown on the drawings.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233113 – DUCTWORK

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of ductwork is indicated on drawings and by requirements of this section.

B. Types of ductwork required for project include the following:

1. Heating supply and return air systems.
2. Air conditioning supply and return air systems.
3. Fresh air supply systems.
4. Mechanical exhaust systems.
5. Air relief systems.
6. Fume hood exhaust systems.
7. Wood shop exhaust system.

C. Specific Duct System Classifications:

Service	Material	Pressure Class	Velocity
HVAC Supply	Galvanized Steel	2" WG	2500 FPM
Return Relief Exhaust	Galvanized Steel	1" WG Negative	1500 FPM
Air Plenums	Galvanized Steel	2" WG	2500 FPM
Fume hood	Stainless Steel	4" WG Negative	4000 FPM
Woodshop	Galvanized Steel	5" WG Negative	3000 FPM

D. External insulation for ductwork is specified in Division 23 insulation sections, and is not included as work of this section.

E. Duct accessories are specified in Division 23 Section and are included as work of this section.

F. Inlets and outlets are specified in Division 23 section and are included as work of this section.

G. Duct lining, as specified herein and indicated on drawings, is included as work of this section.

1.02 SUBMITTALS

A. Product data: Submit manufacturer's specifications on manufactured products and factory fabricated ductwork, used for work of this section.

B. Shop drawings: Submit dimensioned layouts of ductwork showing both the accurately scaled ductwork and its relation to space enclosure. Duct dimensions shall be external and provide adequate space to include lining and maintain internal dimensions indicated on contract drawings. When appropriate, show modifications of indicated requirements made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

C. As-Built drawings: At project closeout, submit as-built drawings of installed ductwork, duct accessories, and outlets and inlets, in accordance with requirements of Division 01.

1.03 QUALITY ASSURANCE AND REQUIRED CODES AND STANDARDS

A. SMACNA standards (metal and flexible ductwork) - comply with SMACNA "HVAC Duct Construction Standards" latest edition for fabrication and installation of metal and flexible ductwork.

B. SMACNA standards (thermoplastic duct) - comply with SMACNA "Thermoplastic Duct (PVC) Construction Manual" latest edition for fabrication and installation of thermoplastic (PVC) ductwork.

C. SMACNA standards (fibrous glass ductwork) - comply with SMACNA "Fibrous Glass Duct Construction Standards" latest edition for fabrication and installation of fibrous glass ductwork.

D. SMACNA standards (industrial duct) - comply with SMACNA "Accepted Industry Practice for Industrial Duct Construction"; "Accepted Industry Practice for Round Industrial Duct Construction"; and "Accepted Industry Practice for Square Industrial Duct Construction", latest editions, for fabrication and installation of industrial ductwork.

E. SMACNA standards: Comply with SMACNA "Duct Liner Standards" for installations of duct liner in sheet metal ductwork.

F. NYS compliance: Comply with NFPA 90 A "Standard for the Installation of Air Conditioning and Ventilating Systems."

G. Mechanical Code of New York State

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect shop fabricated and factory fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

A. Exposed ductwork materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discolorations, and other imperfections, including those which would impair painting.

B. Sheet metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ANSI/ASTM A 527, lockforming quality, with ANSI/ASTM A 525, G90 zinc coating, mill phosphatized for exposed locations.

C. Flexible Duct - Polyethylene Vapor Barrier Type. Where indicated, provide insulated flexible duct as follows:

1. Galvanized steel helix, formed and mechanically locked to fabric.
2. Aluminum foil trilaminate, fiberglass and aluminized polyester, mechanically locked (no adhesive).
3. Exterior fiberglass insulation blanket factory wrapped. Thermal conductance, C factor, not more than 0.23.
4. Outer jacket of gray fire retardant polyethylene material.

5. UL listed per UL 181, Class 1 Air Duct.
6. Operating temperature range -20 degrees to 250 degrees F.
7. Flame spread less than 25, smoke developed less than 50.
8. Working pressures:

    a. 6 inch w.g. positive (all diameters).
    b. 4 inch w.g. negative, through 16 inch diameters.
    c. 1 inch w.g. negative, 18 to 20 inch diameters.

9. Rated velocity: 4,000 FPM.
10. Manufacturer:

    a. Flexmaster, Type 3.
    b. Clevaflex USA, Inc.
    c. Thermaflex.

D. Flexible Duct Fittings: Provide factory manufactured galvanized steel fittings. Use 45 degree laterals, ball mouth tees, spin collars, or conical tees for duct taps. 90 degree tees shall not be allowed.

2.02 DUCT LINER

A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.

1. Manufacturers:

    a. CertainTeed Corp.; Insulation Group.
    b. Johns Manville International, Inc.
    c. Knauf Fiber Glass GmbH.
    d. Owens Corning.

B. Materials: ASTM C 1071; surfaces exposed to air stream shall be coated to prevent erosion of glass fibers.

    a. Thickness: 2 inches.
    b. Thermal Conductivity (k-Value): 0.26 at 75°F (0.037 at 24°C) mean temperature.
    c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
    d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
    e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.

        1) Tensile Strength: Indefinitely sustain a 50-lb- (23-kg) tensile, dead-load test perpendicular to duct wall.
        2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into air stream.
        3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.03 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Duct sealant: Non-hardening, non-migrating mastic elastic sealant (type applicable for fabrication/installation detail) as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Liquid allowed for slip joints only. Silicone base duct sealer shall be used on duct joints exposed to weather.

C. Ductwork support materials.

1. For galvanized steel ductwork, provide hot dipped galvanized steel fasteners, anchors, rods, straps, trim and angles.
2. For stainless steel ductwork, provide matching stainless steel support materials.
3. For flexible ductwork, provide hot dipped galvanized steel support material.

D. Duct Connector: Where duct system meets or exceeds pressure class of 2" w.g., positive or negative, incorporate the use of rolled, formed, machine manufactured duct connector.

1. Manufacturer: Subject to compliance with requirements, provide duct connector of one of the following:

2. Ward.
3. Ductmate.
4. United McGill.
5. Flexmaster.

2.04 SHOP FABRICATION

A. Shop fabricate ductwork in 4, 8, 10 or 12 foot lengths, unless otherwise indicated or required to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for re-assembly and coordinated installation.

B. Shop fabricate ductwork of gages and reinforcement complying with applicable SMACNA standard.
C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with inside radius equal to associated duct width. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.

D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division 23 section "Duct Accessories" for accessory requirements.

E. Fabricate ductwork with duct liner in each section of duct where indicated. Fabricate ductwork large enough to accept liner of thickness indicated and to maintain inside dimensions shown on contract drawings. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.

F. Provide lining in all ductwork that is conveying below ambient temperature air and is not insulated. Provide lining in supply air and return air ductwork from air handling unit to 20 feet away from the unit. Provide lining in ductwork as indicated on drawings.

2.05 FACTORY FABRICATED DUCTWORK

A. General: At Installer's option, provide factory fabricated spiral, round or oval duct and fittings, in lieu of shop fabricated duct and fittings.

B. Gauge: Tables 3-2 and 3-3 SMACNA "HVAC Duct Construction Standards." No standing rib shall be allowed.

C. Oval Elbows: 3 gore 90 degree and 2 gore 45 degree with machine formed seam.

D. Round Elbows: one piece construction for 90 degree and 45 degree elbows 14" and smaller. Provide 5 gore 90 degree and 3 gore 45 degree construction for larger diameter with machine formed seam joint.

E. Divided flow fittings: 90 degree tees, constructed with saddle tap spot welded and bonded to duct fitting body.

F. Manufacturer: subject to compliance with requirement, provide factory fabricated ductwork of one of the following:

1. United Sheet Metal Div., United McGill Corp.
2. Semco

PART 3 - EXECUTION

3.01 INSTALLATION OF DUCTWORK

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight (5% leakage) and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling.

B. Duct Sizing: Duct sizes indicated on drawings are inside dimensions.

C. Flexible Duct: Flexible duct may be used for connecting room diffuser to sheet metal duct and/or ceiling terminal box only. Extend flexible duct completely and limit lengths to five feet (5'), or as indicated on Drawings. Support according to SMACNA.

D. Seal ductwork to seal class as prescribed in SMACNA "HVAC Duct Construction Standards" for the static pressure classes indicated, unless otherwise recommended.

E. Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.

F. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

G. Electrical equipment spaces: Do not run ductwork through transformer vaults and their electrical equipment spaces and enclosures.

H. Boiler Rooms: Do not run ductwork through boiler rooms unless protected per NFPA requirements.

I. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct-plus insulation with sheet metal flanges of same gage as duct. Overlap opening on four sides by at least 1-1/2".

J. Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

K. Support ductwork in manner complying with appropriate SMACNA standard.

3.02 INSTALLATION OF WOODSHOP EXHAUST (N/A)

3.03 APPLICATION OF LINER IN RECTANGULAR DUCTSS

A. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.

C. Butt transverse joints without gaps and coat joint with adhesive.

D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).

G. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.

H. Secure transversely oriented liner edges facing the airstream with metal nosing's that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

1. Fan discharges.
2. Intervals of lined duct preceding unlined duct.
3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.

I. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used; secure buildouts to duct walls with bolts, screws, rivets, or welds.

3.04 CLEANING AND PROTECTION

A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

B. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.

C. Temporary closure - at ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

3.05 BALANCING

A. Refer to Division 23 Section 230593 "Testing, Adjusting and Balancing" for air distribution balancing of ductwork. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233300 – DUCT ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of duct accessories work is indicated on drawings and in schedules, and by requirements of this section.

B. Types of duct accessories required for project include the following:

1. Fire and smoke dampers(in compliance with NFPA80-STD for opening protectives)
2. Access doors
3. Turning vanes
4. Manual Dampers
    a. Butterfly manual dampers
    b. Opposed-blade manual dampers
5. Intake/Exhaust dampers
6. Flexible connections

1.02 SUBMITTALS

A. Product data - submit manufacturer's specifications for each type of duct accessory, including dimensions, capacities, and materials of construction, and installation instructions.

B. Shop drawings - submit assembly type shop drawings for each type of duct accessory showing interfacing requirements with ductwork, and method of fastening or support.

C. Maintenance data - submit manufacturer's maintenance data including parts lists for each type of duct accessory, include this data in Maintenance Manual.

1.03 QUALITY ASSURANCE

A. SMACNA compliance - comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) high pressure and low pressure duct construction standards.

B. Industry standards - comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to construction of duct accessories, except as otherwise indicated.

C. UL compliance - construct, test and label fire dampers in accordance with Underwriters Laboratories (UL) Standard 555 "Fire Dampers and Ceiling Dampers".

D. NFPA compliance - comply with applicable provisions of ANSI/NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of duct accessories.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver components with factory installed packing and protective containers.

B. Handle components carefully to prevent damage to components and finish. Do not install damaged components; replace with new.

C. Protect components from weather, dirt, construction traffic and debris, etc.

PART 2 - PRODUCTS

2.01 FIRE AND SMOKE DAMPERS

A. Standards, Fire and Smoke Dampers: Conform to the requirements of NFPA 90A and UL listed, labeled and rated 1-1/2 hours, and in compliance with NFPA80-STD for opening protectives.

B. Provide fusible links 165 degrees F., vibration proof and secured with clinched "S" hooks or stainless steel bolts and lock nuts.

C. Smoke Dampers: Conform to UL, fit with control shafts for operation by electric or pneumatic motors. Provide a 165 degrees F thermal link.

D. Access Doors: Provide adjacent to all fire and smoke dampers.

E. Manufacturer: Subject to compliance with requirements, provide products by one of the following.

1. Ruskin Mfg. Co.
2. Controlled Air, Inc.

2.02 ACCESS DOORS

A. Standard: Conform to SMACNA.

B. Location: Provide access doors in casings, plenums and ducts where shown on Drawings and where specified for ready access to operating parts including fire dampers, smoke dampers, valves, and concealed coils.

C. Pressure Classification: Construct and install access doors in accordance with SMACNA Standards to suit the static pressure classifications and the locations where installed.

D. Access Doors in Ducts: Provide and size doors as follows.

1. Minimum 24-inch by 24-inch clear opening.
2. When field conditions require an access opening smaller than 16-inch by 12-inch, provide a 24-inch long removable section of casing or duct, secured with quick acting locking devices, 6 inches on centers, to permit ready access without dismantling other equipment.

E. Door Requirements: Provide doors in casings and duct as follows.

1. Arrange doors so that system air pressure will assist closure and prevent opening when the system is in operation.
2. Coordinate doors and equipment to provide unrestricted passage through clear door opening, without removal of any equipment.
3. Where pressure regulating dampers are installed in ducts or plenums, provide access doors with a clear wire glass observation port, 6-inch by 6-inch minimum size. Anchor port with structural metal frame, resilient gaskets and stainless steel bolts.

F. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.

1. Ruskin Mfg. Co.
2. Flexmaster USA, Inc.
3. Ductmate Ind., Inc.
4. United McGill Corp.

2.03 TURNING VANES

A. Acoustic Turning Vanes: Construct of airfoil shaped aluminum extrusions with perforated faces and fiberglass fill.

B. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.

1. Air Filter Corp.
2. Anemostat Products Div., Dynamics Corp. of America.
3. Duro-Dyne Corp.
4. United McGill Corp.

2.04 MANUAL DAMPERS

A. Provide dampers of single blade (butterfly) type, constructed in accordance with SMACNA Duct Standards.

B. Provide dampers of multiple, opposed-blade type, constructed in accordance with SMACNA Duct Standards.

C. Bearings: Two piece molded synthetic.

D. Axles: 1/2" plated steel hew.

E. Control Shaft: 1/2" diameter.

F. Finish: Mill.

G. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.

1. Ruskin Mfg. Co.
2. Controlled Air, Inc.
3. United McGill Corp.

2.05 INTAKE OR EXHAUST DAMPERS

A. General: Provide low leakage, airfoil dampers; opposed blade arrangement; AMCA rated 6 CFM/sq. ft. at 4" w.g.

B. Construction

1. Frame: 6063T5 extruded aluminum hat channel 0.125 wall thickness 5" x 1" (5" x 1/2" top and bottom 12" high or less).
2. Blades: 6" wide 6063T5 heavy gage extruded aluminum airfoil shape with extruded metal (aluminum) jam seals.
3. Linkage: Concealed.

4. Operators: Control operators specified under "Controls" Section, and is work of Division 23.

C. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.

1. Construction Specialties, Inc.
2. Ruskin Mfg. Co.
3. Arrow United Industries, Inc.

2.06 FLEXIBLE CONNECTIONS

A. Fans: Provide flexible connections between fans and ducts or casings where indicated on the Drawings or required to accommodate expansion and vibration.

B. Material: Construct connections of cotton duck, minimum 20 ounces per square yard.

C. Elevated Temperature: For temperatures in excess of 100 degrees F., and corrosive, acid alkali or garage exhausts use close woven glass cloth, double neoprene coated, minimum 28 ounces per square yard.

D. Length: Limit flexible connections to 4-inch active length in the direction of airflow.

E. Standard: Construct in accordance with SMACNA Standards.

F. Attachment: Attach to fans, casings and ductwork as specified by manufacturer.

G. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.

1. Vent Fabrics, Inc. or equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which duct accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install duct accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install turning vanes in square or rectangular 90 degree elbows in supply and exhaust air systems, and elsewhere as indicated.

C. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.

D. Coordinate with other work, including ductwork, as necessary to interface installation of duct accessories properly with other work.

E. Field quality control - operate installed duct accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233400 – FANS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of fan work is indicated on Drawings and Schedules, and by requirements of this section.

B. Types of fans required for this project include the following:

1. Centrifugal fans

C. Vibration isolation required for fans is specified in other Division 23 sections, and is included as work of this section.

D. Refer to Division 26 sections for wiring work, not work of this section.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model, clearly indicating dimensions, weights (shipping and installed), furnished accessories, motor efficiencies, installation and start-up instructions.

B. Shop Drawings: Submit shop drawings showing unit dimensions, details, method of assembly of components, and field connection details.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply and control wiring to equipment. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

D. Maintenance Data: Submit maintenance data and parts list for each type of equipment, and accessory. Include this data and product data in maintenance manual, in accordance with Division 01 requirements.

1.03 QUALITY ASSURANCE

A. Provide fans which have been tested and rated in accordance with AMCA Standards and bear AMCA Certified Rating Seal.

B. Provide fans which have been listed and labeled by UL.

C. Provide motors and electrical accessories complying with NEMA Standards, and complying with NEC Code for workmanship and installation requirements.

D. The manufacturer shall guarantee the fan to deliver the full quantity of air specified under the conditions stipulated without excessive vibration and with low noise level. Fans to have AMCA certified ratings based on tests made in accordance with AMCA Standard 210 and bear the UL label.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver fans with factory installed shipping skids and lifting lugs, pack components in factory fabricated protective containers.

B. Handle fans carefully to prevent damage to components and finish. Do not install damaged components.

C. Protect components from weather, dirt, construction traffic, etc.

PART 2 - PRODUCTS

2.01 CENTRIFUGAL FANS

A. General: Provide centrifugal fans of size, type, arrangement and capacity as scheduled on Drawings, and as specified herein.

B. Ratings: Test and rate fans in accordance with ASHRAE Standard 51 (AMCA Standard 210). Provide fans bearing AMCA Certified Ratings Seal.

C. Fan Units: Provide factory assembled and tested fan units consisting of housing, wheel, fan shaft, bearings, vibration isolators, and side support structure. Clean, condition, and prime paint sheet metal parts prior to final assembly.

D. Housings: Provide curved scroll housings, lockseam construction for sizes 24 inches to 40 inches, spot welded construction for sizes 44 inches to 60 inches, and continuous weld construction for sizes 66 inches and larger. Provide horizontally split housings, bolted together for sizes 66 inches and larger. Provide spun inlet cones and duct connections.

E. Wheels: Provide BI / FC / Airfoil type blades (see schedule on drawings). Weld blades to wheel rim and hub plate. Key wheels to shafts. True and dynamically balance wheels after assembly.

F. Shafts: Construct of AISI C 1040 or C 1045 solid hot rolled steel, turned and polished.

G. Bearings: Provide heavy duty, grease lubricated, precision anti-friction ball or roller, self-aligning, pillow block type bearings selected for minimum average life (AFBMA L 50) of 100,000 hours.

H. Motors

1. Motor characteristics: Except where more stringent requirements are indicated, comply with the following requirements for motors:

    a. Temperature rating: Rated for 40 degrees C environment with maximum 50 degrees C temperature rise for continuous duty at full load (Class A Insulation.

    b. Starting capability: Provide each motor capable of making starts as frequently as indicated by automatic control system, and not less than 5 starts per hour for manually controlled motors.

    c. Phases and current characteristics: Provide motors as scheduled; squirrel-cage induction polyphase motors for 1/2 hp and larger, and provide capacitor-start single-phase motors for 1/3 hp and smaller, except 1/6 hp and smaller may, at equipment manufacturer's option, be split phase type. Do not purchase motors until power characteristics available at locations of motors have been confirmed, and until rotation directions have been confirmed.

    d. Service factor: 1.15 for polyphase motors and 1.35 for single-phase motors. All motors shall be premium efficiency type, in conformance with LIPA commercial energy rebate program.

e. Motor construction: Provide general purpose, continuous duty motors, Design "B", except "C" where required for high starting torque.

1) Bearings: Ball or roller bearings with inner and outer shaft seals, regreasable except permanently sealed where motor is normally inaccessible for regular maintenance. Where belt drives and other drives produce lateral or axial thrust in motor, provide bearings designed to resist thrust loading.

2) Enclosure type: Except as otherwise indicated, provide totally enclosed, fan cooled (TEFC) motors for indoor use. Provide weather protected Type I for outdoor use.

3) Efficiency: Provide premium efficiency motors with efficiency as required to conform with current LIPA commercial energy rebate standards.

f. Name plate: Provide metal nameplate on each motor, indicating full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

I. Drives: Provide V-belt drive, selected for 1.4 service factor. Provide adjustable pitch sheave, selected for midpoint at design conditions.

J. Accessories: Provide the accessories as indicated on the schedule on the project drawings.

K. Manufacturer: Subject to compliance with requirements, provide centrifugal fans of one of the following:

1. Carnes Company Inc.
2. Greenheck Fan Corp.
3. Twin City Fan Corp.

PART 3 - EXECUTION

3.01 INSPECTION

A. General: Examine areas and conditions under which fans are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF FANS

A. General: Except as otherwise indicated or specified, install fans in accordance with manufacturer's installation instructions and recognized industry practices to ensure that fans serve their intended function.

B. Coordinate with other work of as necessary for proper interfacing.

C. Electrical Wiring: Ensure fans are wired properly, with rotation in intended direction for proper performance. Furnish copy of manufacturer's wiring diagram submittal to electrical installer.

3.03 FIELD QUALITY CONTROL

A. Testing: After installation of fans has been completed, test each fan to demonstrate proper operation of units at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

3.04 SPARE PARTS

A. General: Furnish to Owner, with receipt, one spare set of belts for each belt driven item.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233543 – VARIABLE FREQUENCY DRIVES

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Variable frequency drives indicated by Drawings and Schedules.

B. Variable frequency drive reactors or isolation transformers.

1.02 SUBMITTALS

A. Submit manufacturer's data on variable frequency drives and motors.

B. Shop drawings of AFC, reactors, and wiring diagrams shall be provided with list of parts including fuses and breakers.

C. Maintenance Data - submit maintenance data and spare parts list for variable frequency drives and motors. Include this data in Maintenance Data.

1.03 QUALITY ASSURANCE

A. Comply with NEC as applicable to wiring methods, construction and installation of variable frequency drives and motors.

B. Comply with applicable requirements of UL 508, "Electrical Industrial Control Equipment", pertaining to variable frequency drives. Provide variable frequency drives and motors which have been UL listed and labeled.

C. Comply with applicable portions of NEMA Standards pertaining to motor controllers/starters and enclosures.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store variable frequency drives in clean dry place prior to installation. Protect from weather, dirt, fumes, water and physical damage etc.

B. Protect after installation similarly. Do not install until location is enclosed and weathertight.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Provide products of one of the following:

1. Reliance Electric VTAC V
2. Toshiba
3. Mitsubishi Electric

B. General

1. Provide AFC suitable to serve as starter and a disconnect to the motor.

2. The adjustable frequency controller (AFC) together with all options and modifications shall mount within standard NEMA 1 enclosure suitable for continuous operation with a maximum ambient of 40 degrees C.
3. All high voltage component within enclosure shall be isolated with steel covers.
4. The complete unit shall be UL approved and labeled as an assembly.
5. The AFC shall not emit any measurable electro magnetic interference at a distance of 3 feet from unit.
6. Convert 60 Hz line frequency and voltage to stepless motor control from 10 percent to 110 percent of base speed.

C. Electrical Characteristics

1. DV/Dt and Di/Dt protection for semiconductors.
2. Capable of starting into a rotating load without delay.
3. Protective circuits shall cause instantaneous trip (IET) should any of the following faults occur:

    a. 110% of controller maximum sine wave current rating is exceeded.
    b. Output phase to phase short circuit condition.
    c. Low input line voltage.
    d. Loss of input line voltage.
    e. Loss of input phase.
    f. External fault. This protective circuit shall permit, by means of terminal strip, wiring of remote NC safety contacts such as high static, firestat, etc., to shut down the drive.

4. The following adjustments shall be available in the controller:

    a. Maximum frequency (55 to 66 Hz) factory set at 60 Hz.
    b. Minimum frequency (6 to 35 Hz) factory set 6 Hz.
    c. Acceleration (2 to 20 seconds) factory set at 20 seconds.
    d. Deceleration (2 to 20 seconds) factory set at 20 seconds.
    e. Volts/Hertz ratio factory set for 460V at 60 Hz.
    f. Voltage offset or boost factory set at 100% torque.
    g. Current limit (50% of 110% sine wave current rating) factory set at 100% current.

5. Door mounted operator controls.

    a. Auto/manual switch.
    b. Start/stop (reset) switch.
    c. Manual speed control.

6. Automatic mode, controller will follow an external signal and respond to remote start-stop contact wired to terminal strip. LED's will be door mounted and will indicate power on, drive fault, motor running and external fault.

7. Input disconnect: Provide a positive disconnect between the controller and all phases of the incoming A-C line. This disconnect shall be designed to mount inside the controller enclosure and include a mounting bracket and through-the-door interlocking handle with provisions for padlocking.

    a. The basic switch shall be thermal magnetic, molded case circuit breaker.

D. Motor overload: Contains thermal overload relay designed to protect one A-C motor, operated on AFC output, from extended overload operation.

E. Isolated Process Control Interface: Enables the AFC to follow a 0-5, 1-5, 4-20 10-50 ma; 1-4, 0-8, 0-10 VD-C grounded or ungrounded signal from a process controller.

F. Voltage, current and Frequency Meters: Provide to indicate the output voltage, output frequency and output current.

G. Plug-in Tester Card: Provide a quick means for monitoring the different signals within the AFC for start-up and troubleshooting. The tester card printed circuit board shall be a 44 pin type which can be plugged into AFC regulator rack. One tester shall fit all AFC units.

H. Provide shielded isolation transformer to change voltage from 208V/3PH/60Hz input to 460V/3PH/60 Hz output, for supply fans only.

I. The AFC shall have an auxiliary contact that will send a run/start indication to the temperature control system.

2.02 LINE REACTORS

A. Provide line reactors for wiring upstream of the AFC. The reactors shall be sized for the maximum current of the drive with the reactance to match the AFC.

PART 3 - EXECUTION

3.01 INSTALLATION OF VARIABLE FREQUENCY DRIVES AND MOTORS

A. Install AFC and motors as indicated, in accordance with manufacturer's written instruction, applicable requirements of NEC, NEMA Standards, and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate with General Contractor and Division 26 Contractor for installation and wiring of AFC's and motors.

C. Ensure three phase motors are rotating in correct direction.

D. Provide positive electrical equipment and motor groundings.

3.02 ADJUST AND CLEAN

A. Inspect operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finish.

3.03 FIELD QUALITY CONTROL

A. Subsequent to wire/cable hook-up, energize motor starters and motors, and demonstrate functioning of equipment in accordance with requirements, were necessary correct malfunctioning units.

3.04 START-UP AND WARRANTY SERVICES

A. The manufacturers shall provide start-up services, completely checking out the operation and performance of the variable frequency drive. Manufacturer shall furnish Owner with Operation and Maintenance instructions including four (4) sets of operations and maintenance manuals with full parts list.

B. The manufacturers shall provide a one-year full parts and labor warranty from date of start-up and owner acceptance.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 233713 – DIFFUSERS, REGISTERS AND GRILLES

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Scope: Extent of air diffuser and register work required in this Section is indicated on the Drawings and schedules and by the requirements of this Section.

B. Types required for project include the following:

1. Ceiling air diffusers.
2. Wall and duct registers and grilles.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's standard technical product data including capacity ratings, throw, drop, diffusion, terminal velocities, noise levels, adjustability, construction details, finish and mounting details.

B. Shop Drawings.

1. Provide dimensioned shop drawings of linear diffuser mounting, plenum dimensions, plenum connections, damper connections and branch ductwork connections.

a. Draw shop drawings showing plans, sections, mounting details and finishes.
b. Furnish certified test data, including acoustical performance of the air troffer/boot combination with maximum air quantities indicated on the drawings.

C. Schedule: Submit a schedule of proposed air diffusers, registers and grilles, keyed to the Contract Drawings and indicating the proposed type, size, air quantity, pressure drop and location of each device proposed under this Contract.

1. Manufacturer: Same for all diffusers and registers on project.

1.03 QUALITY ASSURANCE

A. ASHRAE: Test and rate air outlets and inlets in certified laboratories under the requirements of ASHRAE Standard 70.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Original Containers: Deliver air diffusers and registers to the site in manufacturer's original containers. Identify on outside of container type and location to be installed.

B. Protect From Damage: Do not install bent, marred or damaged devices. Replace with new. Store indoors, where possible, or outdoors in weatherproof enclosures above grade.

PART 2 - PRODUCTS

2.01 AIR DIFFUSERS AND REGISTERS: GENERAL

A. Construction: Provide devices as specified on drawings.

1. Treat steel with zinc phosphate or zinc chromate after fabrication.
2. Grind, polish and factory prime.
3. Factory finish with white baked enamel finish, unless otherwise indicated.
4. Roll or reinforce exterior faces and edges.
5. Ensure mitered joints and butt connections mate within 0.010-inch maximum crack.
6. Surface finish: Smooth within 0.005-inch at welds, joints, clamping points and splices.
7. Offsets and bends: Mitered.
8. Mate devices with the associated duct, plenum or boot to form an airtight joint.

B. Provide as scheduled on Drawings.

2.02 SUPPLY OR RETURN REGISTERS

A. Register Type: Adjustable single or double-deflection type, formed steel or extruded aluminum, as indicated on the Drawings; noise levels of NC 20 or less.

B. Bars: Provide adjustable or fixed face bars and fixed rear bars, as indicated by types on Drawings.

C. Frames: Provide stamped or rolled steel or extruded aluminum frames fitted with felt, neoprene or plastic gaskets.

D. Dampers: If indicated on drawings provide register dampers of formed steel, cadmium plated, gang key operated, opposed blade type, and arranged so that the operating mechanism does not project through any part of the register face.

E. Mounting Hardware: Provide round or countersunk head Phillips screws.

F. Air Extractors: Provide 18 gage frames, 22 gage curved steel blades, fixed pattern, screwed to the duct collar, and sized to match register dimensions.

G. Manufacturer: Subject to compliance with requirements, provide registers of one of the following:

1. Titus Products.
2. Anemostat Products Division, Dynamics Corp.
3. Carnes Co., Division of Wehr Corp.

2.03 RETURN GRILLES

A. Construction: Construct as specified for registers, except omit register damper.

B. Bars: Provide fixed horizontal face bars with 1/2-inch spacing and 35 degree downward blade angle.

C. Filters: If indicated on drawings provide 1-inch throw-away filters for return grilles.

D. Manufacturer: Subject to compliance with requirements, provide grille units of one of the following:

1. Titus Products.
2. Anemostat Products Division, Dynamics Corp.
3. Carnes Co., Division of Wehr Corp.

2.04 CEILING DIFFUSERS

A. Ceiling Diffusers: Provide circular, square or rectangular, as indicated on the Drawings; noise levels as indicated on drawings.

B. Diffuser Edge and Framing Details: Compatible with the type of ceilings in which the diffuser is installed. For plaster ceiling provide plaster frames or plaster rings, set flush with finished ceiling.

C. Materials: Refer to drawings.

D. Access: Provide removable internal parts of circular, square or rectangular diffusers, including volume regulators, diffuser face, dampers and equalizing devices.

1. Allow removal of parts, including internal assembly, without the use of special tools.
2. Do not allow removal of diffuser face to disturb the distribution pattern.

E. Finish: Provide baked enamel finish on visible face. Coordinate color with Architect.

1. Interior and concealed parts: Flat black or dark gray.

F. Adjustable Pattern: Provide adjustable pattern diffuser cones to vary the distribution from horizontal parallel to the ceiling to a downward distribution pattern into the space, not on exposed face.

G. Pressure Range: Design to allow equal distribution pattern, both horizontal and vertical, for diffusers with pressure drops from 0.10 to 0.40 inches water gage.

H. Dampers, Diffusers, and Extractors: Products of the same manufacturer.

I. Extractors: Provide adjustable extractors, furnished by the diffuser manufacturer, in each ceiling diffuser where indicated on drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Coordination: Coordinate the location of grilles, registers and diffusers with other trades. Examine areas and conditions under which inlets and outlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Examine architectural floor plans, reflected ceiling plans and elevations and arrange for duct taps to be so placed that the installation of air outlets will present a uniform relationship with architectural features, lighting, sprinkler heads, speakers and smoke detectors.
2. On plain walls, if not otherwise indicated, locate sidewall registers approximately 8 inches down from the finished ceilings.
3. Adjust the face and rear bars of supply registers to provide a diffusion pattern such that the terminal velocity point is approximately 70 percent of the "room" width and 5 to 6 feet above the finished floor, at a velocity of 20 to 50 fpm.
4. On projects with reflected ceiling plans, locate outlets to conform to that plan.
5. If no reflected ceiling plans are included in the Contract Documents, coordinate the location of air outlets with other trades before cutting in ceiling and sidewall taps. Provide coordination drawing in shop drawings.

END OF SECTION

DIVISION 23 – MECHANICAL

236400 – PACKAGED WATER CHILLERS

1. GENERAL

1.1. GENERAL REQUIREMENTS

A. The requirements of this Section shall conform to the general provisions of the Contract, including General and Supplementary Conditions, Conditions of the Contract, and Contract Drawings.

1.2. SCOPE

A. Provide Microprocessor controlled, multiple scroll compressor, air-cooled, liquid chillers of the scheduled capacities as shown and indicated on the Drawings, including but not limited to:

1. Chiller package
2. Charge of refrigerant and oil
3. Electrical power and control connections
4. Chilled liquid connections
5. Manufacturer start-up

1.3. QUALITY ASSURANCE

A. Products shall be Designed, Tested, Rated and Certified in accordance with, and Installed in compliance with applicable sections of the following Standards and Codes:

1. AHRI 550/590 – Water Chilling Packages Using the Vapor Compression Cycle
2. AHRI 370 – Sound Rating of Large Outdoor Refrigerating and Air-Conditioning Equipment
3. ANSI/ASHRAE 15 – Safety Code for Mechanical Refrigeration
4. ANSI/ASHRAE 34 – Number Designation and Safety Classification of Refrigerants
5. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings
6. ANSI/NFPA 70 – National Electrical Code (N.E.C.)
7. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1
8. OSHA – Occupational Safety and Health Act
9. Manufactured in facility registered to ISO 9001

10. Conform to Intertek Testing Services for construction of chillers and provide ETL/cETL Listed Mark

B. Factory Run Test: Chiller shall be pressure-tested, evacuated and fully charged with refrigerant and oil, and shall be factory operational run tested with water flowing through the vessel.

C. Chiller manufacturer shall have a factory trained and supported service organization.

D. Warranty: Manufacturer shall Warrant all equipment and material of its manufacture against defects in workmanship and material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first.

1.4. DELIVERY AND HANDLING

A. Unit shall be delivered to job site fully assembled with all interconnecting refrigerant piping and internal wiring ready for field installation and charged with refrigerant and oil by the Manufacturer.

B. Provide protective covering over vulnerable components for unit protection during shipment. Fit nozzles and open ends with plastic or fabric enclosures.

C. Unit shall be stored and handled per Manufacturer’s instructions.

2. PRODUCTS

2.1. CHILLER MATERIALS AND COMPONENTS

A. General: Install and commission, as shown on the schedules and plans, factory assembled, charged, and tested air cooled scroll compressor chiller(s) as specified herin. Chiller shall be designed, selected, and constructed using a refrigerant with Flammability rating of "1", as defined by ANSI/ASHRAE STANDARD 34 Number Designation and Safety Classification of Refrigerants. Chiller shall include not less than two refrigerant circuits above 50 tons (200kW), scroll compressors, direct-expansion type evaporator, air-cooled condenser, refrigerant, lubrication system, interconnecting wiring, safety and operating controls including capacity controller, control center, motor starting components and special features as specified herin or required for safe, automatic operation.

B. Cabinet: External structural members shall be constructed of heavy guage, galvanized steel coated with baked on powder paint which, when subject to ASTM B117, 1000 hour, 5% salt spray test, yields minimum ASTM 1654 rating of "6".

C. Operating Characteristics: Provide low and high ambient temperature control options as required to ensure unit is capable of operation from -10°F to 125°F (-23°C to 52°C) ambient.

D. Service Isolation valves: Discharge (ball type) isolation valves factory installed per refrigerant circuit. Includes a system high-pressure relief valve in compliance with ASHRAE15.

E. Pressure Transducers and Readeout Capability

1. Discharge Pressure Transducers: Permits unit to sense and display discharge pressure.

2. Suction Pressure Transducers: Permits unit to sense and display suction pressure.

3. High Ambient Control: Allows units to operate when the ambient temperature is above 115°F (46°C). Includes discharge pressure transducers

2.2. COMPRESSORS

A. Compressors: Shall be hermetic, scroll-type, including:

1. Compliant design for axial and radial sealing.

2. Refrigerant flow through the compressor with 100% suction cooled motor.

3. Large suction side free volume and oil sump to provide liquid handling capability.

4. Compressor crankcase heaters to provide extra liquid migration protection.

5. Annular discharge check valve and reverse vent assembly to provide low-pressure drop, silent shutdown and reverse rotation protection.

6. Initial oil charge.

7. Oil level sight glass.

8. Vibration isolator mouonts for compressors.

9. Brazed-type connections for fully hermetic refrigerant circuits.

10. Compressor Motor overloads capable of monitoring compressor motor current. Provides extra protection against compressor reverse rotation, phase-loss and phase-imbalance.

2.3. REFRIGERANT CIRCUIT COMPONENTS

A. Each refrigerant circuit shall include: a discharge service ball type isolation valve, high side pressure relief, liquid line shutoff valve with charging port, low side pressure relief device, filter-drier, solenoid valve, sight glass with moisture indicator, thermostatic expansion valves, and flexible, closed-cell foam insulated suction line and suction pressure transducer.

2.4. HEAT EXCHANGERS

A. Evaporator:

1. Evaporator shall be brazed-plate stainless steel construction capable of refrigerant working pressure of 650 psig (3103 kPa) and liquid side pressure of 150 psig (1034 kPa) [Option for 300 psig (2068 kPa) available].

2. Brazed plate heat exchangers shall be UL listed.

3. Exterior surfaces shall be covered with 3/4" (19mm), flexible, closed cell insulation, thermal conductivity of 0.26k ([BTU/HR-Ft² - °F]/in.) maximum.

4. Water nozzles shall be provided with grooves for field provided ANSI/AWWA C-606 mechanical couplings.

5. Evaporator shall include vent and drain fittings and thermostatically controlled heaters to protect to -20°F (-29°C) ambient in off-cycle.

6. A serviceable wye-strainer and mechanical couplings shall be provided for field installation on evaporator inlet prior to startup.

7. Evaporator shall be provided with piping extension kit and mechanical couplings to extend liquid connection from evaporator to edge of unit. Thermal dispersion type flow switch shall be factory installed in the evaporator outlet pipe extension and wired to the unit control panel. Insulation and heat trace on piping shall be responsibility of installing contractor. Extension kit nozzle connections shall be ANSI/AWWA C-606 (grooved).

B. Air-cooled Condenser:

1. Coils: Condenser coils shall be constructed of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece. Integral sub cooling is included. Coils shall be designed for a design working pressure of 650 PSIG (45 bar). Condenser coil shall be washable with potable water under 100 psi (7 bar) pressure.

2. Low Sound Fans: Shall be dynamically and statically balanced, direct drive, corrosion resistant glass fiber reinforced composite blades molded into a low noise, full-airfoil cross section, providing vertical air discharge and low sound. Each fan shall be provided in an individual compartment to prevent crossflow during fan cycling. Guards of heavy gauge, PVC (poly-vinylchloride) coated or galvanized steel shall be factory installed.

3. Fan Motors: High efficiency, direct drive, 6 pole, 3 phase, insulation class “F”, current protected, Totally Enclosed Air-Over (TEAO) , rigid mounted, with double sealed, permanently lubricated, ball bearings.

4. Low Sound Fans with Variable Speed Drives. All fans shall be powered by VSDs. Fans shall provide vertical air discharge from extended orifices. Fans shall be composed of corrosion resistant aluminum hub and glass-fiber-reinforced polypropylene composite blades molded into a low-noise airfoil section. Fan impeller shall be dynamically balanced for vibration-free operation. Fan guards of heavy gauge, PVC (polyvinyl chloride) coated or galvanized steel.

2.5. CONTROLS

A. General: Automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients.

B. Power/Control Enclosure: Rain and dust tight NEMA 3R powder painted steel cabinet with hinged, latched, and gasket sealed door.

C. Microprocessor Control Center:

1. Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, automatic pumpdown at system shutdown, condenser fans, evaporator pump, evaporator heater, unit alarm contacts, and chiller operation from -10°F to 125°F (-23°C to 52°C) ambient. Automatic reset to normal chiller operation after power failure.

2. Software stored in non-volatile memory, with programmed setpoints retained in lithium battery backed real-time-clock (RTC) memory for minimum 5 years.

3. Forty character liquid crystal display, descriptions in English (or Spanish, French, Italian, or German), numeric data in English (or Metric) units. Sealed keypad with sections for Setpoints, Display/Print, Entry, Unit Options & clock, and On/Off Switch.

4. Programmable Setpoints (within Manufacturer limits): display language; chilled liquid temperature setpoint and range, remote reset temperature range, daily schedule/holiday for start/stop, manual override for servicing, low and high ambient cutouts, low liquid temperature cutout, low suction pressure cutout, high discharge pressure cutout, anti-recycle timer (compressor start cycle time), and anti-coincident timer (delay compressor starts).

5. Display Data: Return and leaving liquid temperatures, low leaving liquid temperature cutout setting, low ambient temperature cutout setting, outdoor air temperature, English or metric data, suction pressure cutout setting, each system suction pressure, liquid temperature reset via a 4-20milliamp or 0-10 VDC input, anti-recycle timer status for each compressor, anti-coincident system start timer condition, compressor run status, no cooling load condition, day, date and time, daily start/stop times, holiday status, automatic or manual system lead/lag control, lead system definition, compressor starts/operating hours (each), status of hot gas valves, evaporator heater and fan operation, run permissive status, number of compressors running, liquid solenoid valve status, load & unload timer status, water pump status.

6. System Safeties: Shall cause individual compressor systems to perform auto shut down; manual reset required after the third trip in 90 minutes. System Safeties include: high discharge pressure, low suction pressure, high pressure switch, and motor protector. Compressor motor protector shall protect against damage due to high input current or thermal overload of windings.

7. Unit Safeties: Shall be automatic reset and cause compressors to shut down if low ambient, low leaving chilled liquid temperature, under voltage, and flow switch operation.

8. Alarm Contacts: Low ambient, low leaving chilled liquid temperature, low voltage, low battery, and (per compressor circuit): high discharge pressure, and low suction pressure.

9. BAS Communications: BACnet MS/TP, Modbus and N2 communication capabilities are standard.

D. Manufacturer shall provide any controls not listed above, necessary for automatic chiller operation. Mechanical Contractor shall provide field control wiring necessary to interface sensors to the chiller control system.

2.6. POWER CONNECTION AND DISTRIBUTION

A. Power Panels:

1. NEMA 3R/12 rain/dust tight, powder painted steel cabinets with hinged, latched, and gasket sealed outer doors. Provide main power connection(s), control power connections, compressor and fan motor start contactors, current overloads, and factory wiring.

2. Power supply shall enter unit at a single location, be 3 phase of scheduled voltage, and connect to individual terminal blocks per compressor. Separate disconnecting means and/or external branch circuit protection (by Contractor) required per applicable local or national codes.

B. Compressor, control and fan motor power wiring shall be located in an enclosed panel or routed through liquid tight conduit.

2.7. ACCESSORIES AND OPTIONS

A. Some accessories and options supersede standard product features. Your Quantech representative will be pleased to provide assistance.

B. Microprocessor controlled, Factory installed Across-the-Line type compressor motor starters as standard.

C. Low Ambient Control: Permits unit operation to -10°F ambient. Standard unit controls to 30°F ambient.

1. High Ambient Control: Permits unit operation above 115°F ambient.

D. Power Supply Connections:

E. Control Power Transformer: Converts unit power voltage to 120-1-60 (500 VA capacity). Factory-mounting includes primary and secondary wiring between the transformer and the control panel.

F. Protective Chiller Panels (Factory or Field Mounted)

1. Louvered Panels (condenser coils only):Painted steel as per remainder of unit cabinet, over external condenser coil faces.

G. Thermal Dispersion Flow Switch (Factory installed and wired in piping extension kit): Normally open, 30bar pressure rating, stainless steel 316L construction, IP67, -4°F to 158°F ambient rating.

H. Hot Gas By-Pass: Permits continuous, stable operation at capacities below the minimum step of unloading to as low as 5% capacity (depending on both the unit & operating conditions) by introducing an artificial load on the evaporator. Hot gas by-pass is installed on only one refrigerant circuit.

I. Low Temperature Process Glycol: Leaving chilled liquid setpoint range 10°F to 50°F (-12°C to 10°C)

J. Sound Reduction (Factory installed):

1. Compressor Acoustic Sound Blankets

K. Vibration Isolation (Field installed):

3. EXECUTION

3.1. INSTALLATION

A. General: Rig and Install in full accordance with Manufacturer’s requirements, Project drawings, and Contract documents.

B. Location: Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per Manufacturer instructions. Adjust and level chiller on support structure.

C. Components: Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller.

D. Electrical: Coordinate electrical requirements and connections for all power feeds with Electrical Contractor (Division 16).

E. Controls: Coordinate all control requirements and connections with Controls Contractor.

F. Finish: Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish.

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 238223 – UNIT VENTILATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary conditions and Division 01 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Extent of unit ventilator work indicated on drawings and schedule by requirements of this section.

B. Unit ventilators specified in this section include the following:

1. Hot water-heating coil.
2. Steam Heating Coil
3. Chilled water-cooling coil (where applicable).
4. DX Cooling Coil (where applicable).

C. Related Sections: Refer to other Div. 23 sections for the following:

1. Hot/Chilled water piping
2. Refrigerant Piping
3. Steam Piping

D. Other divisions: Refer to Div. 26 sections for the following:

1. Power wiring

1.03 SUBMITTALS

A. Product data - submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights, furnished specialities and accessories, and installation and start-up instructions.

B. Shop drawings - submit manufacturer's assembly type shop drawings indicating dimensions, weight loadings, required clearances and methods of assembly of components. Wiring diagrams - submit manufacturer's electrical requirements for power supply wiring for packaged heating and cooling units. Submit manufacturer's ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

C. Maintenance data - submit maintenance data and parts list for each unit ventilator, control, and accessory, including "trouble-shooting" maintenance guide. Include this data and product data in maintenance manual.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with ARI 440 for testing and rating units.

C. Comply with ASHRAE 33 for testing hydronic coils.

D. Comply with NFPA 70 for components and installation.

E. UL Compliance - provide unit ventilators which are listed by UL and have UL label affixed.

1.05 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace unit ventilators that fail in materials and workmanship within 2 years from date of substantial completion.

1.06 EXTRA MATERIALS

A. Furnish extra materials described below that match product installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Unit Ventilator Filters: Furnish 2 spare filters for each filter installed.
2. Motors: Furnish (2) spare motors for each size unit ventilator motor size used on the project.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle unit ventilators and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged packaged heating and cooling units or components, replacewith new.

B. Store unit ventilators and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Magic Aire / Carrier
2. Modine Corporation
3. Carrier Corp.

2.02 UNIT VENTILATORS

A. Description: A vertical, floor-mounting assembly including cabinet, filter, coil, fan and motor in draw-through configuration with the following:

1. Cooling coil
2. Heating Coil, reheat position.
3. Temperature controls (field installed)

2.03 MATERIALS

A. Unit Frame: Welded, galvanized heavy gage steel.

B. Insulation: 1-inch (25mm) duct liner complying with ASTM C1071 and attached with adhesive complying with ASTM C916.

1. Fire-Hazard Classification: Duct liner and adhesive shall have a maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E84.

C. Drain Pans: Galvanized steel, with connection for drain. Drain pan shall be insulated with polystyrene or polyurethane insulation.

D. Cabinet: Galvanized steel, with removable panels fastened with tamperproof fasteners and key-operated access door.

E. Cabinet Finish: Phosphatize coat with baked-on primer and manufacturer's standard paint, in color selected by Architect.

F. Cabinet Top: Galvanized steel, with baked enamel finish.

G. Discharge Air: Welded steel linear bar grille.

1. Air-Outlet Location: Top

H. Outdoor Louver: Types and sizes as scheduled with the following features and provisions:

1. Horizontal wall intake louver.
2. Construction: Aluminum.
3. 1/2-inch (13 mm) mesh screen on interior side of intake.
4. Finish: Clear anodized to match existing.
5. Protective grille for louver – clear anodized to match existing conditions.

I. Mixing Dampers: Steel damper blades with edge and side seals and nylon bearings, operated by factory-mounted operator to control outside-air/return air.

J. Face and Bypass Dampers (Where applicable): Steel damper bladed with edge and side seals and nylon bearings, operated by factory-mounted electric operator.

2.04 COILS

A. Hot Water / Steam Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm) and rated for a minimum working pressure of 300 psig (2068 kPa) and a maximum entering water temperature of 275 deg. F (135 deg. C) with manual air vent and drain plug.

B. Chilled Water Coil: Copper tube, with mechanically bonded aluminum fans spaced no closer than 0.1 inch (2.5 mm) and rated for a minimum working pressure of 200 psig (1378 kPa) with manual air vent and drain plug.

C. DX Coils for VRF: Provide cooling coils that are performance certified by the VRF manufacturer. Coils to be rated to 700 psi pressure certification. Electronic expansion valve kits to be supplied and certified by the VRF manufacturer.

2.05 FAN

A. Centrifugal, with forward-curved wheels and fan scrolls made of galvanized steel or thermoplastic material; directly connect to motor.

2.06 FAN MOTORS

A. Permanent split capacitor multispeed motor with integral thermal-overload protection and resilient mounts. Connect motor to chassis wiring with plug connection.

2.07 FILTERS

A. Filters: 1-inch (25-mm) thick, glass-fiber media.

2.08 ACCESSORIES

A. Storage Cabinets:

1. Material: Bottom, back and sides of cabinet to be 18-ga. Steel. Fully adjustable shelves to be 18-ga. Steel. Unit base to be 16-ga. Steel.

2. Cabinet to have open space with false back for piping and electrical circuits.

3. Finish: powder coat finish with color selected by architect.

4. Units to be provided with sizes and quantities shown on architectural drawings.

2.09 CONTROL SYSTEMS

A. Automatic Temperature Controls: Field installed controls to be furnished as described under section 230900 of this specification. In addition to section 230900, the following control items shall be included.

1. Provide occupant adjustment capability for the following:

a. Room temperature set point.
b. Minimum outside-air percentage.
c. Unoccupied room temperature set point.

2. Controls components shall include the following.

a. Thermistor mounted in unit return air with manual adjustable override.
b. Unit capillary manual reset freezestat, covering entire face of coil.
c. Ventilation lockout relay to close ventilation damper during occupied operation.
d. Exhaust fan interlock relay to open outside damper when exhaust fan is on or to open depressurization damper when outdoor air damper is open (dampers to operate in parallel).
e. Day-night control switch.
f. Day-night control relay for remote signal.

B. Safety Devices: Each unit shall have the following safety devices:

1. Manual disconnect switch.
2. Spring-loaded interlock de-energize control circuit, fan, and heating elements when front panel is removed.
3. Heat-dissipation switch keeps fans running when unit discharge temperature rises above 100 deg. F (38 deg. C).

4. Overcurrent protective fuses.
5. Branch-circuit fusing to protect heating-element subdivision circuits (maximum 48 A).
6. Motor and control circuit fuses.
7. Low-temperature, cutout thermostat strapped to air coil prevents coil from freezing and liquid from slugging.

C. Control Devices: Field mount the following devices:

1. Outside-air damper actuator.
2. Discharge air thermostat.
3. Heating-coil valve.
4. Cooling-coil valve (where applicable).
5. Face and bypass damper actuator (where applicable).
6. Room thermostat.
7. Freeze protection thermostat.
8. Cooling lockout thermostat.

2.10 SOURCE QUALITY CONTROL

A. Verification of Performance: Test and rate condensing units according to ARI 210/240.

B. Test unit ventilator coils according to ASHRAE 33.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install unit ventilators to comply with NFPA 90A.

B. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

C. Mechanical Contractor to install storage cabinets per architectural drawings/details unless otherwise indicated on the drawings.

3.02 CONNECTIONS

A. Unless otherwise indicated, install shutoff valve and union or flange at each connection.

B. Install piping adjacent to machine to allow service and maintenance.

3.03 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality control testing and report results in writing:

1. After electrical circuitry has been energized, start units to conform proper motor rotation and unit operation.

2. Test and adjust controls and safeties.

B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes general, procedural, and administrative requirements, for electrical products, equipment, and installation practices applicable to this Division.

1.02 RELATED DOCUMENTS

A. All Contract drawings, Contract General and Supplementary Conditions, Division 01 Specification Sections, and Bidding Requirements apply to this section.

B. The requirements of this section shall apply to all other sections of Division 26.

C. The general electrical requirements of this division shall also apply to:

1. Division 23 – Heating, Ventilating and Air Conditioning
2. Division 27 – Communications
3. Division 28 – Electronic Safety and Security

1.03 SCOPE OF WORK

A. It is the declared intent of the project drawings and these specifications that the contractor shall provide for the complete installation of operational electrical circuits and systems as outlined in the project documents.

B. The Electrical Contractor shall provide all materials, equipment, labor, transportation, storage, etc., as necessary for, and incidental to, the completion of all electrical work as indicated on the Drawings and in these Specifications.

C. Included in the above is all related electrical demolition activities, temporary electrical facilities to support the work, final testing, adjusting training as applicable.

D. Before submitting his proposal, the Electrical Contractor shall be fully informed to the extent, character, and intent of the work to be done by him. No consideration will be granted for any misunderstanding of the material to be furnished or work to be performed.

1.04 USE AND INTERPRETATION OF DRAWINGS

A. The drawings are intended to be diagrammatic in nature and are for general electrical design and arrangement of circuits and components. Drawings do not detail every component of the electrical work, nor do they detail complete routing paths. Unless otherwise noted, the locations and elevations of electrical system components are approximate. Exact final locations are subject to the approval of the Owner's Representative. Additional minor adjustments may also be required to avoid conflicts with furniture or other obstructions or field condions. Similarly, the routing of services, feeders, branch circuits, system wiring, as indicated on the drawings, is not intended to be the exact routing. Verify routing with Owner’s Representative.

B. Unless specifically noted otherwise, branch circuit designations, i.e. “home run” designations, are for grouping purposes only to indicate the panelboard or interconnection box from which the branch circuit is served. Actual panel pole circuit numbers are to be determined in the field.

C. Drawings do not show all offsets, fittings, supports, pull or splice interferences, and elevation changes. Adjust installation of conduit, equipment location, etc. to accommodate work with the obstacles and interferences. Where a major and important rearrangement is necessary, report same to Architect for review. Obtain written approval for all major changes.

D. Cooperate with all other Contractors and Owners and determine the exact route of all raceways and location of all equipment the Drawings are diagrammatic and indicate the general arrangement of systems and equipment unless indicated otherwise by dimensions or details. Install work substantially as indicated. Exact equipment locations and raceway routing, etc. shall be governed by actual field conditions and/or instructions of the Engineer and/or Owner's Representative.

E. During the course of the work, should any ambiguities or discrepancies be found on the drawings or in the specifications, to which the Contractor has failed call attention before submission of his bid, then the Engineer shall interpret the intent of the drawings and specifications, and the Contractor hereby agrees to abide by the Engineer's interpretation and agrees to carry out the work in accordance with the decision of the Engineer. It is expressly stipulated that neither the drawings nor the specifications shall take precedence, one over the other, with the exception the more stringent requirement shall prevail, and it is further stipulated that the Engineer may interpret or construe the drawings and specifications of the work, and of that question, the Engineer shall be the sole judge.

1.05 COMPLETE SYSTEMS

A. The drawings and specifications are intended to provide for a complete, operational electrical installation. However, both the drawings and specifications are for the Electrical Contractor's guidance and are in no way intended to give every detail of the existing conditions or new installations, nor do they describe every fitting required for the installation of the work. The Electrical Contractor shall furnish, install, and place in workmanlike manner all equipment, accessories, supports, fittings, backboxes and all other material needed for a complete electrical and operational installation. The Electrical Contractor shall make all final connections to equipment. The Electrical Contractor shall prepare such additional drawings as necessary or required for any purpose and shall submit them for the approval of the Engineer.

1.06 APPLICABLE CODES, STANDARDS AND REGULATIONS

A. Comply with NFPA 70 (National Electrical Code (NEC)), version currently adopted by the Authority Having Jurisdiction (AHJ). Comply with NECA (National Electrical Contractor's Association) Standards for minimum professional installation methods and practices. Comply with all applicable federal, state and local laws, ordinances, codes, rules and regulations. Where the Contract Documents exceed these requirements, the Contract Documents shall govern. In no case shall work be installed contrary to or below minimum legal standards. Comply with local authorities having jurisdiction (AHJ) and resolve any conflicts. Where conflicts between codes and standards arise, the more stringent requirements shall be adhered to.

B. The current applicable rules, restrictions and requirements of the utility companies providing service to the project site/facilities shall be adhered to. Provide all required coordination.

C. Should any materials installed, or work performed, be found to be not in compliance with any of the listed codes and regulations, provide all materials, labor, and pay all costs necessary to correct the deficiencies at no additional cost.

1.07 REFERENCE CODES & STANDARDS

A. All work shall be in accordance with:

1. New York State Uniform Fire and Prevention Codes and Supplements (latest editions in effect at time of bid):

   a. New York State Building Code
   b. New York State Existing Building Code
   c. New York State Energy Conservation Code
   d. New York State Fire Code

2. The latest editions at time of bid (unless otherwise noted) of the below standards of the following:

a.	ADA	Americans with Disabilities Act
b.	ASA	American Standards Association
c.	ASTM	American Society for Testing Materials
d.	ETL	Electrical Testing Laboratories, Inc
e.	IES	Illuminating Engineering Society of North America.
f.	IEEE	Institute of Electrical and Electronic Engineers
g.	IPCEA	Insulated Power Cable for Engineers Association
h.	OSHA	Occupational Safety and Health Act
i.	NEC	National Electric Code (2017)
j.	NECA	National Electrical Contractor's Association
k.	NEMA	National Electrical Manufacturers Association
l.	NESC	National Electrical Safety Code
m.	NFPA	National Fire Protection Association
n.	UL	Underwiter's Laboratories

3. Listings: All equipment, materials and devices shall be listed and labelled by a Nationally recognized Testing Laboratory (NRTL), such as Underwriters Laboratories, Inc (UL) for the intended use and shall bear its label.

4. The Rules and Regulations of the local utilities providing service to the project location.

5. The Rules and Regulations of the local Authority Having Jurisdiction (AHJ).

6. The Directives of the Owner of the Facility where the work is being performed.

B. Before submitting his bid, the Electrical Contractor shall be familiar with the rules of the aforementioned Boards, Departments, Agencies, etc. having jurisdiction, applicable Codes. and shall notify the Engineer with his bid, if in his opinion any work or materials specified is contrary to any such rules. Otherwise, the Electrical Contractor shall be responsible for the approval of all work or materials and in case the use of any material specified is not permitted, a substitute approved by the authorities and by the Engineer shall be furnished and installed without additional cost to the Owner.

1.08 DEFINITIONS

As Specified	All materials, equipment including the execution thereof as called for/shown in the Contract Documents.
Code Requirements	Minimum requirements necessary for compliance with applicable codes.
Concealed	Work not readily visible, including, but not limited to that which is inside walls, above ceilings, below or within slabs, below grade, within pipe and duct shafts chases or recesses.
Exposed	Work readily visible, including, but not limited to, that which is installed on wall/ceiling surfaces, below ceilings, etc. or otherwise not concealed.

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
Furnished by Others	Materials, equipment provided by others received and/or installed by the Electrical Contractor. It includes receiving delivery at job site.
Inspection	Visual observations by Owner, his Site Representative, Architect/Engineer, or another Agency.
Install	All labor and materials necessary, and incidental to, the mount or place equipment, etc., completely connect and make operational.
Labeled	Classification by a standards agency.
Provide	Furnish and install complete and operational.
Relocate	Disconnect, disassemble, and transport equipment to new locations, then clean, install and test and make ready for use. All necessary wiring and raceway extensions shall be considered incidental to the relocation process.
Remove	Disconnect, disassemble, dismount and dispose of off-site, including all associated appurtenances, wiring and raceway rendered unnecessary by the removal.
Reinstall	All labor and materials necessary, and incidental to, mount or place previously removed equipment at or near its pre-existing location. Clean completely connect and make operational. Includes minor wiring rework necessary.
Remove	Disconnect, disassemble and dispose. Includes demolition of associated wiring and conduit rendered unnecessary by removal of subject item.
Replace	Remove and provide new item.
Review	A general contractual conformance check of specified products.
Roughing	Conduit, backboxes etc. pursuant to equipment layout and installation.
Safe Off	De-energize, disconnect and make safe for removal or other work in the area by the Electrical Contractor or by Others.
Satisfactory	In conformance with and as specified in Contract Documents.
Site Representative	Owner’s designated Construction Manager or Inspector at the work site.

1.09 EXISTING CONDITIONS

A. The Electrical Contractor, before submitting his bid, shall examine the site to which this work is in any way dependent upon according to the intent of these specifications and accompanying drawings. He shall report to the Architect/Engineer, in writing, prior to bid, any conditions which prevent him from performing his work. No “Waiver of Responsibility” for inadequate, incomplete, or defective work will be considered by the Engineer unless written notice had been filed by the Electrical Contractor with his bid.

B. Where existing electrical systems of any voltage or purpose, or portions thereof, are to be re-used or modified, the Electrical Contractor shall test the affected portions for the purpose of identifying

pre-existing operational deficiencies. This shall include, but is not limited to, fire alarm, public address, security, CCTV, etc. Report any deficiencies, in writing, to the Owner or his designated representative. Deficiencies occurring after testing, not previously identified, shall be considered as a result of Contractor activities and shall be restored to working condition at no additional cost. If the Owner requests any of the pre-existing deficiencies be corrected by the Contractor, these shall be addressed at additional contract cost.

1.10 PERMITS, INSPECTIONS AND CERTIFICATES

A. The Electrical Contractor shall procure and pay for all necessary drawings, permits, inspections and certificates required by the various governing agencies, etc. having jurisdiction or utilities providing service as part of the bid and shall turn over to the Engineer all permits for construction before starting work and certificates of test, inspection, and approval before requesting payment.

B. Included in the above, the Electrical Contractor shall obtain a Certificate of Electrical Inspection for completed work from an approved third-party electrical inspection agency serving the project locale.

1.11 QUALITY ASSURANCE

A. The Electrical Contractor shall be regularly engaged in the production or installation of specified products, and systems for not less than three years.

B. All work under this Division shall be performed by a licensed electrician or done so under his direct supervision.

C. All painting, patching, concrete work, carpentry, welding, core drilling, etc. incidental to the completion of Division 26 work shall be performed by skilled tradespersons appropriate to the work.

1.12 SUBMITTALS

A. Within 30 days of the signing of the contract, prepare and submit for approval, per the procedures set forth in Division 01, all submittals required by Division 01, this Division and by all other Contract Documents.

B. Required submittals may include, but not be limited to: Schedule of Values; Subcontractor List(s); Product Data; Shop Drawings; Test Reports; Calculations, Photometric Analysis, Certifications; Warranties; Operation & Maintenance Manuals; Record Drawings and various administrative submittals. Provide samples or mock-ups upon request at no additional cost.

C. The number of copies submitted shall be as indicated in Division 01, or elsewhere in the Specifications or Contract Drawings. Electronic (.pdf or similar) may be submitted in lieu of hardcopies where permitted. Generally, all equipment and materials of the same classification, type or kind shall be submitted at one time.

D. For materials, devices, equipment, etc. to be installed, as required in subsequent individual Division 26 sections, submit product data consisting of manufacturer's standard catalog cuts, descriptive literature and/or diagrams, etc. Submittals shall be provided in sufficient detail so as to clearly indicate compliance with all specified requirements and standards. Documents shall be clearly marked to indicate proposed product, selected options, selected accessories, selected finishes, etc. Please clearly indicate any equipment tags for each item as indicated on Drawings for correlation.

E. For systems and equipment, as required in subsequent individual Divisions 26 sections provide project specific Shop Drawings which shall include all information listed in the Shop Drawings submittal requirements in the respective specification section. Include all pertinent information including, but not limited to, equipment/system identification, manufacturer/model, nameplate data,

dimensions, sizes, capacities, types, material, accessories and options, etc. Include any relevant performance data, system risers, wiring diagrams, etc. The documents provided shall be in sufficient detail so as to clearly indicate compliance with all project requirements and standards.

F. Any construction delays caused by failure to submit shop drawings on time or in the proper format shall be the responsibility of the Electrical Contractor.

G. Substitutions: Where products or materials are specified hereinafter by manufacturer's name and/or model number, they shall be considered as the standard and as most satisfactory for their purpose of use on the site or in the building. Another manufacturer's product other than those indicated may be submitted in lieu of the specified product with the understanding that the Engineer shall be the sole judge as to the equality to the specified item and acceptability of the submitted items. In addition, furnish to the Engineer or Owner upon request, and within 14 days of such a request, samples of any Base Bid and/or corresponding Alternate Bid item and/or intended substitute equipment, fixtures, etc. for their comparison and selection. Furnish any additional requested product information, calculations, etc. at no additional cost. Submission of substituted items is with the understanding that neither the Engineer nor the Owner is responsible for any delays or additional costs arising from review, acceptance, denial of said substituted item. Furthermore, any additional costs in material, labor, etc. or delays relating to the installation of substituted item shall be at no additional cost to the Engineer or Owner.

1.13 GUARANTEE

A. For guarantee requirements, refer to the applicable section of the Conditions of the Contract.

PART 2 – PRODUCTS

2.01 GENERAL

A. Except where existing materials and equipment are called for to be reused, all materials and equipment furnished and installed under Division 26 shall be new, of standard first grade quality, undamaged, defect-free, and correctly designed for their specific purpose. All new materials and equipment shall conform to the standards of and be listed/labeled by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories (UL) and shall be approved for use by all local authorities having jurisdiction.

B. All equipment and material furnished shall be the manufacturer's standard item of production unless specifically specified or required to be modified to suit job conditions. Size, material; finish dimensions, and the capacities for the specified application shall be published in catalogs for national distribution by the manufacturer. Ratings and capacities shall be certified by a nationally recognized rating bureau.

C. Where specific devices, equipment, systems (or portions thereof) are indicated to be re-used, the Electrical Contractor, in the presence the Owner or his representative, shall verify proper operation of same prior to commencing work. Report any pre-existing defects or non-functioning items to the Engineer/Architect. The Electrical Contractor shall be held responsible for correcting and/or replacing any unreported items found to be defective up until Owner Acceptance at no additional cost.

D. Equipment and material fabricated specifically for use on this project shall be in strict accordance with the Drawings and Specifications and shall conform to the latest standards of the National Electric Manufacturer's Association.

E. All materials and equipment of one and the same kind, type, or classification and used for identical purpose shall be made by the same manufacturer.

2.02 NEW CIRCUIT BREAKERS INSTALLED IN EXISTING PANELBOARDS

A. New circuit breakers installed in existing panelboards shall be listed for use in the intended panelboard.

B. The new circuit breaker's interrupting rating shall meet or exceed the interrupting rating of the intended panelboard.

PART 3 – EXECUTION

3.01 GENERAL

A. The electrical installation work shall be in accordance with the intent of the Contract Documents, and applicable Codes and Standards, and manufacturer' as determined by the Engineer.

B. All materials and equipment shall be installed as in accordance with manufacturer's instructions, by mechanics experienced and skilled in their trade, in a neat and professional manner, in accordance with trade standards, and so as not to void any warranty or UL listing.

C. Any workmanship considered by the Architect/Engineer as being faulty or substandard shall be removed and replaced by the Contractor to the satisfaction of the Architect/Engineer at no additional cost to the Owner.

D. All work under the electrical contract shall be performed under the Contractor's direct supervision. Provide sufficient and qualified personnel necessary to complete the work in accordance with the Contract Documents and in accordance with the project schedule.

E. Prior to installation, examine the areas and conditions under which the work is to be performed. Identify any conditions which will impact the proper and timely completion of the work. Do not proceed until the impacting conditions have been corrected.

F. Install electrical raceways, wiring and systems parallel and perpendicular to building surfaces and components to the extent possible. Equipment, boxes, etc. shall be installed level and plumb.

G. In general, run branch circuits in concealed above dropped ceilings, in furred walls, in voids and chases. All devices, conduits, wiring and conduits shall be recessed in new construction. In existing unfinished areas, such as mechanical spaces and storage areas wiring may be run exposed. In existing finished and public spaces where wiring cannot be practically concealed, such as block surfaces, wiring may be run in finished surface raceways secured using mechanically fastened clips.

H. Unless otherwise indicated, provide final connections to all equipment, in accordance with manufacturer's instructions.

3.02 SAFE WORK PRACTICES

A. To the greatest extent possible, all electrical work shall be performed on de-energized material and equipment using appropriate lock-out/tag-out procedures per OSHA requirements.

B. Work on energized systems shall be approved by the Owner's representative. All persons working on energized equipment shall wear appropriate personal protective equipment (PPE) following safe work practices and the latest version of NFPA 70E. A minimum of two people is required to be working to ensure the safety of each.

3.03 DELIVERY, STORAGE AND HANDLING OF MATERIALS

A. Comply with Division 01 requirements.

B. The Contractor shall arrange with the Owner for storage of delivered materials related to the work. Where the Owner cannot provide safe, adequate, or sufficient space, provide off-site storage or, with owner approval, arrange and pay for sufficient secure on-site storage container(s). Locations of storage containers shall be coordinated with the Owner.

C. The Electrical Contractor shall be responsible for coordinating, off-loading, receiving and storing all deliveries related to the work. Coordinate all haul routes and schedules with the Owner or Construction Manager.

D. Products shall be delivered in manufacturer's original unopened packaging, with manufacturer's identification and product labelling.

E. Products shall be stored in a manner which shall protect them from theft, damage, weather and entry of debris. Comply with all manufacturer's written storage recommendations.

F. Promptly inspect delivered goods for damage and deficiencies. Arrange for their prompt replacement or removal from the site. Do not install damaged products.

3.04 COORDINATION AND COOPERATION

A. The work called for in the Contract Drawings Specifications shall be carried on in conjunction with the continued operation of the building. The work shall be arranged such that its installation and operation will conform with and facilitate the early installation of the work.

B. The Electrical Contractor shall bear the expense required to revise his work due to any failure to coordinate the installation of his work with that of the building's operation.

C. Unless otherwise stated in the Contract Drawings, all outages to building systems will occur when the building is not in use. The Electrical Contractor shall include all premium time charges in the bid.

D. The Electrical Contractor shall be responsible for the distribution and information concerning his work as required for the prompt installation. The Electrical Contractor will be held fully responsible for any delay in the work resulting from failure to distribute any information, etc. regarding his work as required. See also the applicable sections of the Conditions of the Contract.

E. The Electrical Contractor shall coordinate and cooperate with the Contractors of other trades, Subcontractors, outside agencies, and with the Owner regarding placement, anchorage and accomplishment of the work. Resolve interferences between work of other disciplines or Contractors, prior to commencing installation.

F. Coordinate with other trades for all demolition activities. Provide mark-outs for items to be demolished by others. De-energize and safe off circuits in demolition areas as required for a safe work area.

G. Coordinate with other trades and with Owner for chases, slots and openings during the project as required to complete the installation of the electrical work in timely manner.

H. Coordinate with other trades in scheduling all installation activities with the overall goal of completion of the project in a timely manner.

I. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

J. During the installation of equipment and raceways, provide any offsets, fittings, boxes, accessories to achieve changes in elevation or location as necessary to avoid obstacles and interferences, per actual field conditions.

K. Piping or other systems which are dependent upon slope have the right of way.

L. Provide temporary dust caps on smoke detectors in the work area as necessary to prevent false alarms. Remove when no longer required.

3.05 SHUTDOWNS

A. In accordance with the General Conditions, all shutdowns to existing electrical services are to be scheduled and approved, in advance, in writing, by the Owner. Unless otherwise noted, assume all temporary shutdowns to be performed while the building is not in operation. Include all premium time in bid. Include any applicable utility shutdown fees in bid.

3.06 DIMENSIONING

A. Refer to architectural or other dimensioned drawings. However, field measurements take precedence over dimensioned drawings. Do not scale drawings.

3.07 PROTECTION OF THE WORK

A. The Electrical Contractor shall effectively protect, at his expense, all materials and equipment, including his employees and building occupants, during the period of construction and shall be held responsible for all damage done to his work, until the same is fully accepted by the Architect. See also the applicable sections of the Conditions of the Contractor. Protect all electrical materials, equipment and work from the vandalism, weather elements, theft, paint overspray, concrete and mortar, construction debris and damage, etc. until acceptance by the Owner. Repair, replace and clean all electrical work so affected at no additional cost to the Contract.

3.08 CUTTING AND PATCHING

A. All cutting, core drilling, etc. required to facilitate the proper installation of all work to be installed under Electrical ids the responsibility of the Electrical Contractor, unless indicated otherwise. All cutting shall be done in the manner specified and/or directed and approved by the Engineer and only after permission of the Engineer is obtained. The installation of sleeves, chases, etc. in concrete walls, floors, ceilings, and roofs as well as the cutting of existing concrete walls, floors, ceilings, and roofs shall be done by core drilling. All patching will be the responsibility of this Contractor.

B. All penetrations to exterior walls and below grade foundations shall be made through sleeves provided by the Electrical Contractor and thoroughly sealed and caulked airtight and watertight.

C. Roof penetrations shall be performed via approved roof curbs, pitch pockets, pipe portals etc. Unless otherwise indicated, provide all required materials and labor to perform the penetration and subsequent repair. All penetrations shall be repaired and sealed airtight and watertight in accordance with existing roof warrantees and roof manufacturer directions. In no case shall any roof penetration or repairs violate existing warrantees.

D. Provide all new patching work to match existing conditions.

3.09 WATERPROOFING

A. Wherever any of the work of Division 26 must pierce any waterproofing, this work shall be done by the Electrical Contractor with care. After the part of these systems have been put in place through this waterproofing, the opening made by same shall be waterproofed and made absolutely water-tight as approved by the Architect and/or as hereinafter specified.

B. Conduits piercing the cement waterproofing of walls and floors shall be provided with waterproof conduit entrance seal sleeves around same. These sleeves shall be Type “WSK” (walls) or “FSK” (floors) as manufactured by O-Z or other approved.

C. Conduit sleeves through non-waterproofed, non-fire-rated walls and floors shall be grouted, caulked with oakum, and sealed with approved semi-plastic mastic compound on both sides of the wall.

D. All roof penetrations shall be performed in a manner to obtain watertight seal and in conformance with existing roof warrantees. Unless provided by others, provide pitch pockets, pipe portals or other means consistent with existing roof warrantees for any roof penetrations. Coordinate penetrations for rooftop HVAC equipment with the Mechanical Contractor.

3.10 FIRESTOPPING

A. Provide and apply listed firestopping materials to penetrations of fire-rated floor and wall assemblies for electrical installation. Firestopping shall restore original fire-resistance rating of assembly or better. Firestopping materials and installation requirements are specified in Section 078413 – Penetration Firestopping.

3.11 CEILING REMOVALS

A. Unless otherwise noted in the contract Documents, existing ceilings which must be removed for the Electrical Contractor’s installation or demolition work shall be done by the Electrical Contractor. No ceiling shall be removed without prior approval of the Owner. When directed by the Owner or Owner’s Representative, removed ceilings shall restored at the end of each working day. Ceilings which must be removed shall be restored to their original condition as soon as practical and prior to final payment.

B. Store any removed ceiling tiles either in the ceiling space or at a designated space in the building until re-installation.

C. Take all necessary precautions to prevent damage to the existing ceilings.

D. Replace Contractor damaged ceiling tiles with new ceiling construction to match the existing and to the Owner’s satisfaction.

E. Coordinate with other trades when ceiling related work must be performed in common work areas.

F. In areas with pre-existing ceiling damage, coordinate with the Owner’s representative to document said damage, and determine if the Owner wishes to provide replacement ceiling materials for re-installation.

3.12 PHASE ROTATIONS

A. The Electrical contractor is responsible to verify and maintain facility phase rotations throughout.

3.13 PAINTING AND FINISHING

A. Where final painting and finishes are not being provided by other trades, provide all priming and painting to cuts and patches performed under this Contract in finished areas to match existing conditions.

B. Provide matching painting and patching for surfaces in finished areas at locations of Electrical demolition and/or removals.

C. Provide matching painting and patching to building surfaces damaged as result of Electrical installation work.

D. Provide touch up painting to equipment furnished under this contract.

E. All painting materials shall conform to paint specifications elsewhere in the Contract Documents, or in the absence of same, shall be suitable for the surfaces and environments used. In no case shall lead based paints be used.

3.14 CHECKOUT, TESTING AND ADJUSTING

A. Provide all required programming, integration and adjustments, tune-ups. etc. as required to bring the equipment or system up to fully operational condition.

B. All tests required by the National Electrical Code, approved Electrical Inspection Agencies, State and Local Authorities, the servicing Utility Company, and the Engineer shall be executed by or paid for by the Electrical Contractor. Furnish all labor, material, and instruments for each test. All major tests shall be witnessed by the Engineer. Owner's representative and/or the Authority having jurisdiction, all of whom shall be given a minimum of one week's written notice prior to such tests.

C. Tests shall be scheduled at least one week in advance and at a time so as not to disrupt building operation, and to allow Engineer and Owner representative(s) the opportunity to witness the test, unless directed otherwise. Tests shall not be scheduled until the system installation is complete and fully operational, unless indicated or otherwise directed.

D. Where required by subsequent specification sections or by the manufacturer, arrange for and pay all costs for manufacturer's authorized representative(s) to be present at time of system or equipment start-up. The manufacturer's representative shall provide system integration and programming, start-up supervision, conduct and/or certify all required testing and adjusting, and provide any required training to the end user.

E. Coordinate with the Owner or his designated representative where Owner preferences or input is required for system setup.

F. Submit test reports neatly typewritten on 8-1/2 x 11" sheets indicating system or equipment being tested, date, and time of test, testing methodology, witnesses, testing results and any other pertinent information. Within five (5) days of test completion, submit written or electronic (PDF) copy of test reports for Engineer review, and include a copy with the appropriate operation and maintenance data.

G. At no additional cost, the Electrical Contractor shall correct any deficiencies found, and replace any defective materials and equipment or unable to perform at design or rated capacity. Repeat testing without additional cost to the Owner or Contract until satisfactory results are achieved. Submit final report indicating any corrective measures taken and satisfactory test results.

3.15 FINAL INSPECTIONS

A. Coordinate and obtain all final inspections as required by these specifications and as required by the Authority Having Jurisdiction. Obtain electrical inspection certificate from an authorized Electrical Inspection Agency. Include all costs in bid. Provide all inspection reports and Inspection certificates as part of closeout documents.

3.16 SYSTEMS DEMONSTRATION

A. The Electrical Contractor shall be fully responsible for instructing the Owner's designated personnel in the operation and maintenance of all equipment and systems furnished under the Contract. All costs required for such instruction and demonstration shall be paid for by the Electrical Contractor. Such instruction shall take place in the presence of the Owner's representative upon completion of the work. The Owner reserve the right to record any training sessions. Furnish for Owner use, Engineer approved, printed and bound copies of all operation and maintenance construction manuals. Included in these manuals shall be one (1) copy of all previously submitted and Engineer "Approved" or "Approved as Noted" shop drawings ("Approved as Noted" shop drawings must first be permanently corrected). Informal or non-Engineer witnessed instructions or instructions to non-designed Owner personnel shall not be recognized as fulfilling these requirements.

3.17 CLEANING

A. Perform cleaning in accordance with Division 01.

B. Maintain a clean work site. Remove from the premises, all packaging / shipping materials, waste, rubbish and construction debris. The premises shall be left clean and free of any debris and unused construction materials prior to final acceptance. Leave the area broom clean.

C. Clean all electrical equipment enclosures of dirt, dust, wire cuttings and other foreign materials.

D. Clean all light fixtures, lenses, reflectors and lamps of dirt, dust, fingermarks etc. Adjust lenses for proper fit.

E. Remove all temporary dust caps from fire alarm devices.

F. Provide touch-up painting to restore and refinish to match original condition surfaces of electrical equipment scratched, marred during shipping, handling or installation. Remove any rust and prime and paint as recommended by manufacturer. Pay particular attention to equipment installed outdoors in areas of harsh environment.

3.18 RECORD DOCUMENTS

A. Prior to final payment, submit Close Out Documentation in accordance with Division 01.

B. As-Built record drawings shall document installed locations of equipment, panelboards, disconnect switches and control devices. Document the approximate as-built routing of major feeders and underground conduit runs.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260529 – FASTENERS, ATTACHMENTS, AND SUPPORTING DEVICES

PART 1 – GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's standard catalog sheets, specifications and installation instructions.

B. Unless noted otherwise, specific manufacturer's and / or model / part numbers indicated in this specification section, shall be interpreted as that "manufacturer and/or model / part number" or equal.

PART 2 - PRODUCTS

2.01 ANCHORING DEVICES

A. Sleeve Anchors: Molly/Emhart's Parasleeve Series, Phillips' Red Head AN, HN, FS Series, or Ramset's Dynabolt Seriesl.

B. Wedge Anchors: Hilti's Kwik Bolt Series, Molly/Emhart's Parabolt Series, Phillips' Red Head WS, or Ramset's Trubolt Series.

C. Self-Drilling Anchors: Phillips' Red Head Series S or Ramset's Ram Drill Series.

D. Non-Drilling Anchors: Hilti's Drop-In Anchor Series, Phillips' Red Head J Series, or Ramset's Dynaset Series.

E. Stud Anchors: Phillips' Red Head JS Series.

2.02 CAST-IN-PLACE CONCRETE INSERTS

A. Continuous Slotted Type Concrete Insert, Galvanized:

1. Load Rating 1300 lbs./ft.: Kindorf's D-986.
2. Load Rating 2400 lbs./ft.: Kindorf's D-980.
3. Load Rating 3000 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-H.
4. Load Rating 4500 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-HD.

B. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded.

C. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept bolts having special wedge shaped heads.

2.03 MISCELLANEOUS FASTENERS

A. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work, selected from the following: Furnish galvanized fasteners for exterior use, or for items anchored to exterior walls, except where stainless steel is indicated.

1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
2. Lag Screws: ASME B18.2.1.
3. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.

4. Wood Screws: Flat head, ASME B18.6.1.
5. Plain Washers: Round, ASME B18.22.1.
6. Lock Washers: Helical, spring type, ASME B18.21.1.
7. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.

B. Stainless Steel Fasteners: Type 302 for interior Work; Type 316 for exterior Work; Phillips head screws and bolts for exposed Work unless otherwise specified.

2.04 TPR (THE PEEL RIVET) FASTENERS

A. 1/4 inch diameter, threadless fasteners distributed by Subcon Products, 315 Fairfield Road, Fairfield, NJ 07004 (800) 634-5979.

2.05 HANGER RODS

A. Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with nuts as required to position and lock rod in place. Unless galvanized or cadmium plated, provide a shop coat of red lead or zinc chromate primer paint.

2.06 "C" BEAM CLAMPS

A. With Conduit Hangers:

1. For 1 Inch Conduit Maximum: B-Line Systems Inc.'s BG-8, BP-8 Series, Caddy/Erico Products Inc.'s BC-8P and BC-8PSM Series, or GB Electrical Inc.'s HIT 110-412 Series.

2. For 3 Inch Conduit Maximum: Appleton Electric Co.'s BH-500 Series beam clamp with H50W/B Series hangers, Kindorf's 500 Series beam clamp with 6HO-B Series hanger, or OZ/Gedney Co.'s IS-500 Series beam clamp with H-OWB Series hanger.

3. For 4 Inch Conduit Maximum: Kindorf's E-231 beam clamp and E-234 anchor clip and C-149 series lay-in hanger; Unistrut Corp.'s P2676 beam clamp and P-1659A Series anchor clip with J1205 Series lay in hanger.

B. For Hanger Rods:

1. For 1/4 Inch Hanger Rods: B-Line Systems Inc.'s BC, Caddy/Erico Products Inc.'s BC, GB Electrical Inc.'s HIT 110, Kindorf's 500, 510, or Unistrut Corp.'s P1648S, P2398S, P2675, P2676.

2. For 3/8 Inch Hanger Rods: Caddy/Erico Products Inc.'s BC, Kindorf's 231-3/8, 502, or Unistrut Corp.'s P1649AS, P2401S, P2675, P2676.

3. For 1/2 Inch Rods: Appleton Electric Co. BH-500 Series, Kindorf's 500 Series, 231-1/2, OZ/Gedney Co.'s IS-500 Series, or Unistrut Corp.'s P1650AS, P2403S, P2676.

4. For 5/8 Inch Rods: Unistrut Corp.'s P1651AS beam clamp and P1656A Series anchor clip.

5. For 3/4 Inch Rods: Unistrut Corp.'s P1653S beam clamp and P1656A Series anchor clip.

2.07 CHANNEL SUPPORT SYSTEM

A. Channel Material: 12 gage steel.

B. Finishes:

1. Phosphate and baked green enamel/epoxy.
2. Pre-galvanized.
3. Electro-galvanized.
4. Hot dipped galvanized.
5. Polyvinyl chloride (PVC), minimum 15 mils thick.

C. Fittings: Same material and finish as channel.

D. UL Listed Systems:

1. B-Line Systems Inc.'s B-22 (1-5/8 x 1-5/8 inches), B-12 (1-5/8 x 2-7/16 inches), B-11 (1-5/8 x 3-1/4 inches).

2. Grinell Corp.'s Allied Power-Strut PS 200 (1-5/8 x 1-5/8 inches), PS 150 (1-5/8 x 2-7/16 inches), PS 100 (1-5/8 x 3-1/4 inches).

3. Kindorf's B-901 (1-1/2 x 1-1/2 inches), B-901 (1-1/2 x 1-7/8 inches), B-902 (1-1/2 x 3 inches).

4. Unistrut Corp.'s P-1000 (1-5/8 x 1-5/8 inches), P-5500 (1-5/8 x 2-7/16 inches), P-5000 (1-5/8 x 3-1/4 inches).

5. Versabar Corp.'s VA-1 (1-5/8 x 1-5/8 inches), VA-3 (1-5/8 x 2-1/2 inches).

E. Hole Patterns: Chose hole patterns (or none) to suit the application.

2.08 MISCELLANEOUS FITTINGS

A. Side Beam Brackets: B-Line Systems Inc.'s B102, B103, B371-2, Kindorf's B-915, or Versabar Corp.'s VF-2305, VF-2507.

B. Pipe Straps:

1. Two Hole Steel Conduit Straps: B-Line Systems Inc.'s B-2100 Series, Kindorf's C-144 Series, or Unistrut Corp.'s P-2558 Series.

2. One Hole Malleable Iron Clamps: Kindorf's HS-400 Series, or OZ/ Gedney Co.'s 14-G Series, 15-G Series (EMT).

C. Deck Clamps: Caddy/Erico Products Inc.'s DH-4-T1 Series.

D. Fixture Stud and Strap: OZ/Gedney Co.'s SL-134, or Steel City's FE-431.

E. Supporting Fittings for Pendent Mounted Industrial Type Fluorescent Fixtures on Exposed Conduit System:

1. Ball Hanger: Appleton Electric Co.'s AL Series, or Crouse-Hinds Co.'s AL Series.

2. Flexible Fixture Hanger: Appleton Electric Co.'s UNJ-50, UNJ-75, or Crouse-Hinds Co.'s UNJ115.

3. Flexible (Hook Type) Fixture Hanger: Appleton Electric Co.'s FHHF, or Crouse-Hinds Co.'s UNH-1.

4. Eyelet: Unistrut Corp.'s M2250.

5. Eyelet with Stud: Kindorf's H262, or Unistrut Corp.'s M2350.

6. Conduit Hook: Appleton Electric Co.'s FHSN, or Crouse-Hinds Co.'s UNH-13.

F. Supporting Fasteners (Metal Stud Construction): Metal stud supports, clips and accessories as produced by Caddy/Erico Products Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Where specific fasteners are not specified or indicated for securing items to in-place construction, provide appropriate type, size, and number of fasteners for a secure, rigid installation.

B. Install anchoring devices and other fasteners in accordance with manufacturer's printed instructions.

C. Make attachments to structural steel wherever possible.

3.02 FASTENER SCHEDULE

A. Material:

1. Use cadmium or zinc coated anchors and fasteners in dry locations.

2. Use hot dipped galvanized or stainless steel anchors and fasteners in damp and wet locations.

3. For corrosive atmospheres or other extreme environmental conditions, use fasteners made of materials suitable for the conditions.

B. Types and Use: Unless otherwise specified or indicated use:

1. Cast-in-place concrete inserts in fresh concrete construction for direct pull-out loads such as shelf angles or fabricated metal items and supports attached to concrete slab ceilings.

2. Anchoring devices to fasten items to solid masonry and concrete when the anchor is not subjected to pull out loads, or vibration in shear loads.

3. Toggle bolts to fasten items to hollow masonry and stud partitions.

4. TPR fasteners to fasten items to plywood backed gypsum board ceilings.

5. Metallic fasteners installed with electrically operated or powder driven tools for approved applications, except:

   a. Do not use powder driven drive pins or expansion nails.
   b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
   c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.
   d. Do not use powder driven fasteners in precast concrete.

3.03 ATTACHMENT SCHEDULE

A. General: Make attachments to structural steel or steel bar joists wherever possible. Provide intermediate structural steel members where required by support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.

1. Make attachments to steel bar joists at panel points of joists.
2. Do not drill holes in main structural steel members.
3. Use “C” beam clamps for attachment to steel beams.

B. Where it is not possible to make attachments to structural steel or steel bar joists, use the following methods of attachment to suit type of construction unless otherwise specified or indicated on the drawings:

1. Attachment to Steel Roof Decking (No Concrete Fill):

    a. Decking With Hanger Tabs: Use deck clamps.
    b. Decking Without Hanger Tabs:

        1) Before Roofing Has Been Applied: Use 3/8 inch threaded steel rod welded to a 4 x 4 x 1/4 inch steel plate and installed through 1/2 inch hole in roof deck.
        2) After Roofing Has Been Applied: Use welding studs, or self-drilling/tapping fasteners. Exercise extreme care when installing fasteners to avoid damage to roofing.

2. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more):

    a. Before Fill Has Been Placed:

        1) Use thru-bolts and fish plates.
        2) Use welded studs. Do not support a load in excess of 250 pounds from a single welded stud.

    b. After Fill Has Been Placed: Use welded studs. Do not support a load in excess of 250 lbs. from a single welded stud.

3. Attachment to Cast-In-Place Concrete:

    a. Fresh Concrete: Use cast-in-place concrete inserts.
    b. Existing Concrete: Use anchoring devices.

4. Attachment to Cored Precast Concrete Decks:

    a. New Construction: Use thru-bolts and fish plates before Construction Work Contractor has placed concrete fill over decks.

5. Attachment to Waffle Type Concrete Decks:

    a. New Construction:

        1) Use cast-in-place concrete inserts in fresh concrete.

    b. If concrete fill has been applied over deck, thru-bolts and fish plates may be used where additional concrete or roofing is to be placed over the deck.

6. Attachment to Precast Concrete Planks: Use anchoring devices, except do not make attachments to precast concrete planks less than 2-3/4 inches thick.

7. Attachment to Precast Concrete Tee Construction:

    a. New Construction:

        1) Use tee hanger inserts between adjacent flanges.

2) Use thru-bolts and fish plates, except at roof deck without concrete fill.

b. Existing Construction:

1) Use anchoring devices installed in webs of tees. Install anchoring devices as high as possible in the webs.

c. Do not use powder driven fasteners.
d. Exercise extreme care in drilling holes to avoid damage to reinforcement.

8. Attachment to Wood Construction: Use side beam brackets fastened to the sides of wood members to make attachments for hangers.

a. Under 15 lbs Load: Attach side beam brackets to wood members with 2 No. 18 x 1-1/2 inch long wood screws, or 2 No. 16 x 1-1/2 inch long drive screws.
b. Over 15 lbs Load: Attach side beam brackets to wood members with bolts and nuts or lag bolts. Do not use lag bolts in wooden members having a nominal thickness (beam face) under 2 inches in size. Install bolts and nuts or lag bolts in the side of wood members at the mid-point or slightly above. Install plain washers under all nuts.

LOAD	LAG BOLT SIZE	BOLT DIAMETER
15 lbs to 30 lbs	3/8 x 1-3/4 inches	3/8 inch
31 lbs to 50 lbs	1/2 x 2 inches	1/2 inch
Over 50 lbs to load limit of structure.	Use bolt & nut.	5/8 inch

c. Do not make attachments to the diagonal or vertical members of wood trusses.
d. Do not make attachments to the nailing strips on top of steel beams.

9. Attachment to Metal Stud Construction: Use supporting fasteners manufactured specifically for the attachment of raceways and boxes to metal stud construction.

a. Support and attach outlet boxes so that they cannot torque/twist. Either:

1) Use bar hanger assembly, or:
2) In addition to attachment to the stud, also provide far side box support.

3.04 CONDUIT SUPPORT SCHEDULE

A. Provide number of supports as required by National Electrical Code. Exception: Maximum support spacing allowed is 4’-0” for conduit sizes 3 inches and larger supported from wood trusses.

B. Use pipe straps and specified method of attachment where conduit is installed proximate to surface of wood or masonry construction.

1. Use hangers secured to surface with specified method of attachment where conduit is suspended from the surface.

C. Use “C” beam clamps and hangers where conduit is supported from steel beams.

D. Use deck clamps and hangers where conduit is supported from steel decking having hanger tabs.

1. Where conduit is supported from steel decking that does not have hanger tabs, use clamps and hangers secured to decking, utilizing specified method of attachment.

E. Use channel support system supported from structural steel for multiple parallel conduit runs.

F. Where conduits are installed above ceiling, do not rest conduit directly on runner bars, T-Bars, etc.

1. Conduit Sizes 2-1/2 Inches and Smaller: Support conduit from ceiling supports or from construction above ceiling.

2. Conduit Sizes Over 2-1/2 Inches: Support conduit from beams, joists, or trusses above ceiling.

3.05 LIGHTING FIXTURE SUPPORT SCHEDULE

A. General: Do not solely support fixtures from ceilings or ceiling supports unless it is specified or indicated on the drawings to do so Using one of the methods described below:

1. Support fixtures to structure using 12 Ga. Aircraft Cable. Wires need not be taught to allow for servicing for the fixture.

2. Support fixtures with hanger rods attached to beams, joists, or trusses. Hanger rod diameter, largest standard size that will fit in mounting holes of fixture.

a. Where approved, channel supports may span and rest upon the lower chord of trusses and be utilized for the support of lighting fixtures.
b. Where approved, channel supports may span and be attached to the underside of beams, joists, or trusses and be utilized for the support of lighting fixtures.

3. Use 2 nuts and 2 washers on lower end of each hanger rod to hold and adjust fixture (one nut and washer above top of fixture housing, one nut and washer below top of fixture housing).

a. Where specified that an adequately supported outlet box is to support a fixture or be utilized as one point of support, support the box so that it may be adjusted to bring the face of the outlet box even with surface of ceiling.

4. Provide additional supports when recommended by the manufacturer.

B. Number of Supports For Ceiling Mounted Lighting Fixtures: Provide at least the following number of supports. Provide additional supports when recommended by fixture manufacturer or shown on the drawings.

1. Commercial and Industrial LED / Fluorescent Fixtures:

a. Support individual fixtures less than or equal to 2 feet wide X 4’ long nominal at 2 points. In addition, lay in fixtures installed in suspended ceilings shall be secured to the grid using manufacturer’s recommended fixture securing clips.
b. Support individual fixtures wider than 2 feet at 4 corners.
c. Support continuous row fixtures less than 2 feet wide at points equal to the number of fixtures plus one. Uniformly distribute the points of support over the row of fixtures.
d. Support continuous row fixtures 2 feet or wider at points equal to twice the number of fixtures plus 2. Uniformly distribute the points of support over the row of fixtures.
e. An adequately supported outlet box may be utilized as one point of support for fixtures weighing less than 50 pounds.

3.06 SPECIAL AREA CEILING MOUNTED EQUIPMENT

A. Provide safety tethers in addition to the standard mounting means for:

1. Lighting fixtures, ceiling speakers, ceiling projectors, etc. installed in Areas of Assembly and/or other high ceiling spaces such as Atriums, Gymnasiums, Natatoriums, Auditoriums, Cafeterias, etc.

2. Theatrical lighting fixtures.

3.07 CHANNEL SUPPORT SYSTEM SCHEDULE

A. Use channel support system where specified or indicated on the drawings.

B. Channel supports may be used, as approved, to accommodate mounting of equipment.

C. Material and Finish:

1. Dry Locations: Use 12 gage steel channel support system having any one of the specified finishes.

2. Damp Locations: Use 12 gage steel channel support system having any one of the specified finishes except green epoxy/enamel.

3. Wet Locations: Use 12 gage steel channel support system having hot dipped galvanized, or PVC finish.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260532 – RACEWAYS, FITTINGS AND ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Rigid Ferrous Metal Conduit (GRC).
   2. Electrical Metallic Tubing (EMT).
   3. Flexible Metal Conduit (FMC).
   4. Liquid-tight Flexible Metal Conduit (LFMC).
   5. Rigid Nonmetallic PVC Conduit (RNC).
   6. Surface Metal Raceways.
   7. Conduit bodies, fittings, and accessories.

1.02 REFERENCES

A. NFPA, NEMA, ANSI, and UL.

1.03 SUBMITTALS

A. Product Data: Manufacturer's standard catalog sheets, specifications and installation instructions.

1.04 QUALITY ASSURANCE

A. Electrical components, conductors, devices and accessories described herein shall be listed and labeled as defined by NFPA 70 by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories (UL), for the intended use and shall bear its label.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from moisture, dirt, and mechanical damage during transit and on-site storage.

B. Cap conduit ends to prevent entry of water and foreign debris.

C. Store all nonmetallic raceways and components out of direct sunlight to prevent UV degradation.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Rigid Ferrous Metal Conduit (a/k/a Galvanized Rigid Conduit (GRC)):

   1. Comply with UL 6 and ANSI C80.1.

   2. Minimum trade size – 3/4".

   3. Provide steel, hot dipped galvanized on the outside and inside, UL categorized as Rigid Ferrous Metal Conduit (identified on UL Listing Mark as Rigid Metal Conduit - Steel or Rigid Steel Conduit), by Atkore Allied Tube & Conduit Corp., Nucor Tubular Products, or Wheatland Tube Co., or approved equal.

B. Electrical Metallic Tubing (EMT):

1. Comply with UL 797 and ANSI C80.3.

2. Minimum trade size - 3/4”.

3. Provide steel, galvanized on the outside and enameled on the inside, UL categorized as Electrical Metallic Tubing (identified on UL Listing Mark as Electrical Metallic Tubing), by Atkore Allied Tube & Conduit Corp., Nucor Tubular Products, or Wheatland Tube Co., or approved equal.

C. Flexible Metal Conduit (FMC):

1. Comply with UL 1.

2. Galvanized steel strip shaped into interlocking convolutions, UL categorized as Flexible Metal Conduit (identified on UL Listing Mark as Flexible Steel Conduit or Flexible Steel Conduit Type RW), by Atkore AFC Cable Systems Inc., Anamet Electrical Inc., Electri-Flex Co., or International Metal Hose Co., or approved equal.

D. Liquid-tight Flexible Metal Conduit (LFMC):

1. Comply with UL 360.

2. UL categorized as liquid-tight flexible metal conduit (identified on UL Listing Mark as Liquid-Tight Flexible Metal Conduit, also specifically marked with temperature and environment application data), by Atkore AFC Cable Systems Inc., Anamet Electrical Inc., Electri-Flex Co., or Universal Metal Hose Co., or approved equal.

E. Rigid Nonmetallic PVC Conduit (RNC), Fittings, and Accessories:

1. Comply with Nema TC2 and UL 651.

2. Minimum trade size – 3/4”.

3. UL categorized as Rigid Nonmetallic, Schedule 40 and Schedule 80 PVC conduit (identified on UL Listing Mark as Rigid Nonmetallic Conduit Aboveground and Underground Schedule 40; Rigid Nonmetallic Conduit Aboveground and Underground Extra Heavy Wall Schedule 80), by Beck Mfg./Picoma Industries, Cantex Inc., ABB/Carlon, Ipex Inc., National Pipe & Plastics Inc., or Atkore Heritage/Queen City Plastics Inc., or approved equal.

F. Surface Metal Raceway, Fittings and Accessories:

1. Comply with UL 5. By ABB Installation Products, Mono-Systems Inc. or Legrand Inc.

2. Provide ivory color unless otherwise noted.

3. Provide minimum Wiremold 700 or equal for single power or data drops. Refer to Division 27 for wireway containing power and technology conductors. Follow manufacturer’s recommended raceway capacity for all types and sizes of conductors.

2.02 FITTINGS AND ACCESSORIES

A. Insulated Bushings:

1. Threaded, malleable iron/zinc electroplate with 105 degrees C minimum plastic insulated throat; Appleton Electric Co.'s BU50I Series, Eaton/Crouse-Hinds' 1031 Series, OZ/Gedney Co.'s IBC-50 Series, Raco Inc.'s 1132 Series, Steel City/ABB Corp.'s BI-901 Series, or Thomas & Betts Corp.'s 1222 Series or approved equal.

2. Threaded malleable iron with 150 degrees C plastic throat; Appleton Electric Co.'s BU501 Series, Eaton/Crouse-Hinds' H1031 Series, or OZ/Gedney Co.'s IBC-50 Series.

B. Plastic Bushings for 3/4 Inch Conduit:

1. 105 degrees C minimum temperature rating; Appleton Electric Co.'s BBU50, BBU75, Blackburn (ABB Corp.'s) 50 BB, 75 BB, Eaton/Crouse-Hinds' 931,932, or OZ/Gedney Co.'s IB-50, IB-75, Hubbell/Raco Inc.'s 1402, 1403, Steel City/ABB Corp.'s BU-502, or Thomas & Betts Corp.'s 222, 223 or approved equal.

2. 150 degrees C temperature rating; Appleton Electric Co.'s BBU50H, BBU75H, Eaton/Crouse-Hinds' H-931, H-932, or OZ/Gedney Co.'s A-50, A-75 or approved equal.

C. Insulated Grounding Bushings:

1. Threaded, malleable iron/zinc electroplate with 105 degrees C minimum plastic insulated liner, and ground lug; Appleton Electric Co.'s GIB-50 Series, Eaton/Crouse-Hinds' GLL Series, OZ/Gedney Co.'s IBC-50L Series, Raco/Hubbell Inc.'s 1212 Series, Steel City/ABB Corp.'s BG-80x (1/2 to 2") Series, or Thomas & Betts Corp.'s 3870 or approved equal.

2. Threaded malleable iron/zinc electroplate with 150 degrees C plastic insulated liner, and ground lug; Appleton Electric Co.'s GIB Series, Eaton/Crouse-Hinds' HGLL Series, or OZ/Gedney Co.'s IBC-50L Series, or Thomas & Betts Corp.'s 3870 or approved equal.

D. Connectors and Couplings:

1. Locknuts: UL, steel/zinc electroplate; Appleton Electric Co.'s BL-50 Series, Eaton/Crouse-Hinds' 11 Series, OZ/Gedney Co.'s 1-50S Series, Hubbell/Raco Inc.'s 1002 Series, Steel City/T&B Corp.'s LN-101 Series, or Thomas & Betts Corp.'s 141 Series or approved equal.

2. Grounding Wedge Thomas & Betts Corp.'s 3650 Series or approved equal.

3. Couplings For Rigid Metal and IMC Conduit: Standard galvanized threaded couplings as furnished by conduit manufacturer, Atkore Allied Tube & Conduit Corp.'s Kwik-Couple, or Thomas & Betts Corp.'s Shamrock.

4. Three Piece Conduit Coupling For Rigid Metal and IMC Conduit: Steel, malleable iron, zinc electroplate; Atkore Allied Tube & Conduit Corp.'s Kwik-Couple, Appleton Electric Co.'s EC-50 Series, Eaton/Crouse-Hinds' 190M Series, OZ/Gedney Co.'s 4-50 Series, Hubbell/Raco Inc.'s 1502 Series, Steel City/ABB Corp.s EK-401 Series, or Thomas & Betts Corp.'s 675 Series.

5. Electrical Metallic Tubing Couplings and Insulated Connectors: Provide Compression type, steel/zinc electroplate; Appleton Electric Co.'s 7000S/7000V Series, Eaton/Crouse-Hinds' 1650, 660S Series, Hubbell Raco Inc.'s 2912, 2922 Series, Steel City/ABB Corp.'s TC-711 Series, or Thomas & Betts Corp.'s 5120, 5123 Series or approved equal.
   a. **Set-screw type fittings, connectors, and couplings are strictly prohibited. All EMT connections shall be of the compression type.**

6. Flexible Metal Conduit Connectors: Arlington Industries Inc.'s Saddle-Grip, OZ/Gedney Co.'s C-8T, 24-34T, ACV-50T Series, or Thomas & Betts Corp.'s Nylon Insulated Tite-Bite Series or approved equal.

7. Liquid-tight Flexible Metal Conduit Connectors: Steel, malleable iron, zinc electroplate, insulated throat; Appleton Electric Co.'s STB Series, Eaton/Crouse-Hinds' LTB Series, OZ/Gedney Co.'s 4Q-50T Series, Hubbell/Raco Inc.'s 3512 Series, Steel City/ABB Corp.'s LT-701 Series, or Thomas & Betts Corp.'s 5332 Series or approved equal.

E. Conduit Bodies (Threaded):

1. Malleable Iron/Zinc Electroplate: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Eaton/Crouse-Hinds' Condulets, OZ/Gedney Co.'s Conduit Bodies, or Thomas & Betts Corp.'s Conduit Bodies or approved equal.

F. Expansion Fittings:

1. Malleable Iron, Zinc Electroplate Finish: Appleton Electric Co.'s XJ or OZ/Gedney Co.'s AX (TX for EMT), with external bonding jumper or approved equal.

2. Electrogalvanized Steel: Eaton/Crouse-Hinds' XJG (XJG-EMT for EMT), or ABB Installation Products.'s XJG, with internal grounding or approved equal.

G. Deflection Fittings: Appleton Electric Co.'s DF, Eaton/Crouse-Hinds' XD, or OZ/Gedney Co.'s Type DX or approved equal.

H. Surface Metal Raceways: Use manufacturers approved fittings: couplings, ells, offsets, boxes etc. listed for use with their raceway system. Match raceway finish.

I. Sealant for Raceways Exposed to Different Temperatures: Sealing compounds and accessories to suit installation; Appleton Electric Co.'s DUC, or Kwiko Sealing Compound with fiber filler, Eaton/Crouse-Hinds' Chico A Sealing Compound with Chico X fiber, Electrical Products Division 3M Scotch products, OZ Gedney Co.'s DUX or EYC sealing compound with EYF damming fiber, or Thomas & Betts Corp.'s Blackburn DX.

J. Vertical Conductor Supports: Kellems/Hubbell Inc.'s Conduit Riser Grips, or OZ/Gedney Co.'s Type M, Type R.

K. Pulling-In-Line For Installation in Spare and Empty Raceways: Polypropylene monofilament utility line; Greenlee/Emerson Electric Co. Poly Line 430, 431, or Ideal Industries Powr-Fish Pull-Line 31-340 Series.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are ready to receive raceway installation.

B. Check routing paths for structural, plumbing, and mechanical interferences before routing or anchoring conduit. Do not proceed with installation until all spatial conflicts are resolved.

3.02 RACEWAY INSTALLATION – GENERAL

A. Install an equipment grounding conductor in all raceways. Raceway shall NOT be relied upon as an equipment ground conductor.

B. For New Work: Number of Raceways: Do not change the number of raceways to less than the number indicated on the drawings.

1. Each raceway shall enclose one circuit unless otherwise indicated on the drawings.

C. For Rehab Work: Number of Raceways: Do not change the number of raceways to less than the number indicated on the drawings except when appropriate for advantageous reuse of existing exposed and concealed raceways (the contract documents do not indicate location, number, size or condition of existing raceways). Existing raceways may be reused if the following conditions are met:

1. The existing raceway must be of adequate size for the new conductors to be installed as per NFPA 70 Chapter 9, Tables 1, 4, & 5; Annex C, Tables C1-C12a. More circuits may be enclosed by existing raceways than the circuiting shown on the drawings provided conductor sizes are increased to compensate for derating (adjustment factors) and other considerations required by NFPA 70 Article 310-15.

2. Remove existing conductors.

3. Demonstrate to the Owner's Representative that the existing raceway is clear of obstructions and in good condition.

4. Check ground continuity. When ground continuity of existing raceway is inadequate install insulated grounding bushings, grounding wedges, bonding straps, grounding jumpers or equipment grounding conductors to establish effective path to ground.

5. Install insulated bushings to replace damaged or missing bushings. Replace non-insulated bushings with insulated bushings on raceway sizes 1 inch and larger.

6. Install vertical conductor supports to replace existing or missing vertical conductor supports.

7. Install extension rings on existing boxes when the number of new conductors installed therein exceeds NFPA 70 requirements.

8. Furnish the Owner's Representative with marked up drawings showing size and routing of existing raceways with number and size of new conductors installed therein. The drawings will be forwarded to the design engineer for verification of NFPA 70 compliance.

D. Raceways for Future Use (Spare Raceways and Empty Raceways): Draw fish tape through raceways in the presence of the Director's Representative to show that the raceway is clear of obstructions.

1. Leave a pulling-in line in each spare and empty raceway.

E. Conduit Installed Concealed:

1. Install conduit concealed unless otherwise indicated on the drawings.

2. Existing Construction:

   a. Run conduit in existing chases and hung ceilings.
   b. If conduit cannot be installed concealed due to conditions encountered in the building, report such conditions and await approval in writing before proceeding.

3. New Construction:

   a. Run conduit in the ceilings, walls, and partitions.

   b. Conduit may not be installed in concrete floor slab unless otherwise indicated on the plans. (concrete slabs that are both ceilings and floors shall be treated as floor slabs).

   c. Where indicated on the drawings, install conduit in concrete slabs, under slabs on grade, or under slabs above finished ceilings where indicated on the drawings. Concrete slabs that are both ceilings and floors shall be treated as floor slabs.

      1) Conduit in Slab: Run ¾-inch conduit in the slab where placement of reinforcement and slab thickness is sufficient to allow 1-1/2 inches of concrete cover over conduit, otherwise run conduit under slab. Run conduit one inch and larger in the slab in the specific location(s) where it is indicated on the drawing to be run in the slab, otherwise run conduit under slab.

         a) Run conduit under reinforcement where reinforcement is in upper portion or middle of slab.
         b) Run conduit over reinforcement where reinforcement is in lower portion of slab.
         c) Run conduit between reinforcement where reinforcement is in upper and lower portions of slab.
         d) Separate parallel conduits minimum of 2 inches so that each conduit will be enveloped in concrete.
         e) Pass conduit over steel beams, if any, parallel with the reinforcement.
         f) Tie down conduit to avoid movement during placement of concrete.
         g) Demonstrate to the Owner's Representative that conduit has been placed to allow minimum of 1-1/2 inches of concrete cover.

      2) Conduit Under Slab on Grade:

         a) Run conduit under vapor barrier, if any.
         b) Install equipment grounding conductor in each conduit. Bond at boxes and equipment to which conduit is connected.

      3) Conduit Under Slab, Above Finished Ceiling:

         a) Attach conduit to bottom of slab or structure supporting the slab.
         b) Firestop through-penetrations of the slab.

4. If any portions of the conduit system cannot be installed concealed due to conditions encountered in the building, report such conditions and await approval in writing before proceeding.

F. Conduits Penetrating Concrete Floor Slabs (Concrete slabs that are both ceilings and floors shall be treated as floor slabs):

1. Provide a minimum of 2 inches between conduits that vertically penetrate elevated concrete slabs.

2. Provide firestopping and spray on fireproofing at locations where conduits penetrate surface of floor slab and slab is part of fire rating required for construction.

G. Conduit Installed Exposed:

1. Install conduit exposed where indicated on the drawings.

2. Install surface metal raceway on existing block wall construction in finished areas.

3. Install conduit tight to the surface of the building construction unless otherwise indicated or directed.

4. Install vertical runs perpendicular to the floor.

5. Install runs on the ceiling perpendicular or parallel to the walls.

6. Install horizontal runs parallel to the floor.

7. Do not run conduits near heating pipes.

8. Installation of conduit directly on the floor will not be permitted.

9. Exposed conduits installed in finished area shall be painted by the Electrical Contractor to match surrounding areas. Exception – where general painting will be provided by other trades.

H. Conduit Size: **Not smaller than ¾-inch electrical trade size**. Where type FEP, THHN, THWN, THWN-2, XHH, XHHW, or XHHW-2 conductors are specified for use under Section 260519, the minimum allowable conduit size for new Work shall be based on Type THW conductors.

I. Conduit Bends: For ¾-inch conduits, bends may be made with manual benders. For all conduit sizes larger than ¾ inch, manufactured or field fabricated offsets or bends may be used. Make field fabricated offsets or bends with an approved hydraulic bender.

3.03 RACEWAY INSTALLATION – SPECIAL AREAS

A. Raceways Exposed to Different Temperatures: Where portions of an interior raceway system are exposed to widely different temperatures, seal interior and exterior of raceway to prevent circulation of air from a warmer to a colder section through the raceway installation.

1. Refrigerated Rooms: Install conduit body or junction box in the raceway system on warm side of refrigerated room. After conductors are installed, seal interior of the raceway at the conduit body or junction box.

2. Heated Areas to Unheated Areas: After conductors are installed, seal interior of the raceway at the nearest conduit body, outlet or junction box in the heated area adjoining the unheated area.

B. Conduit for Prefabricated Walk-In Refrigeration Boxes:

1. Install box wiring in conduit. Run conduit exposed on exterior of box unless project conditions require conduit to be run exposed on interior of box.

   a. Install rigid ferrous metal conduit and galvanized fittings where the metal surfaces are galvanized steel.

2. Create a thermal break where penetrating the box by installing maximum of 12 inches of Schedule 40 high density polyethylene conduit within the conduit run at the penetration. Seal the penetration.

3. Install equipment grounding conductor in each conduit.

4. Seal raceway as specified for raceways exposed to different temperatures.

C. Conduits in Heating Tunnels: Install rigid ferrous metal conduit exposed in the tunnel and run conduit to avoid manhole entrances and other obstructions. Install equipment grounding conductor in each conduit.

D. Conduit in Waterproofed Floors: Install conduit runs in waterproof floors to avoid penetrating the waterproofing. Avoid penetration of waterproofing with conduit risers so far as practicable.

1. Where it is necessary to puncture the waterproofing for a conduit riser, install a standard weight steel pipe sleeve extending one inch above the finished floor level. Flash the steel pipe sleeve to the waterproofing with 16-ounce copper. Construct the flashing with a copper tube extending the full height of the sleeve, soldered to a copper base extending 6 inches in all directions from the sleeve.

2. The flashing will be integrated into the waterproofing by the Construction Contractor. Provide solid cast brass floor plates with chromium finish where pipe sleeves are exposed in rooms.

3.04 SCHEDULES

A. Conduit Application

1. Rigid Ferrous Metal Conduit: Install in all locations unless otherwise specified or indicated on the drawings.
2. Electrical Metallic Tubing:

   a. May be installed concealed as feeder or branch circuit conduits above suspended ceilings where conduit does not support fixtures or other equipment.

b. May be installed concealed as feeder or branch circuit conduits in hollow areas in dry locations, including:

1) Hollow concrete masonry units (CMU), except where cores are to be filled.
2) Drywall construction with sheet metal studs, except where studs are less than 3-1/2 inches deep.

c. May be installed exposed as feeder or branch circuit conduits in dry, unfinished, non-hazardous locations.

3. Flexible Metal Conduit: Install equipment grounding conductor in the flexible metal conduit and bond at each box or equipment to which conduit is connected:

a. Use for final conduit connection to recessed lighting fixtures in suspended ceilings. Use 4 to 6 feet of flexible metal conduit, minimum size 1/2 inch, between junction box and fixture. Locate junction box at least 1 foot from fixture and accessible if the fixture is removed.

b. Use 1 to 3 feet of flexible metal conduit for final conduit connection to:

1) Emergency lighting units.
2) Dry type transformers.
3) Motors with open, drip-proof or splash-proof housings.
4) Equipment subject to vibration (dry locations).
5) Equipment requiring flexible connection for adjustment or alignment (dry locations).

c. Use for concealed branch circuit conduits above existing non-removable suspended ceilings where rigid type raceways cannot be installed due to inaccessibility of space above ceiling.

d. May be installed concealed as branch circuit conduits in drywall construction with sheet metal studs, except where studs are less than 3-1/2 inches deep.

4. Liquid-tight Flexible Metal Conduit: Install equipment grounding conductor in liquid-tight flexible metal conduit and bond at each box or equipment to which conduit is connected:

a. Use 1 to 3 feet of liquid-tight flexible metal conduit (UL listed and marked suitable for the installation’s temperature and environmental conditions) for final conduit connection to:

1) Motors with weather-protected or totally enclosed housings.
2) Equipment subject to vibration (damp and wet locations).
3) Equipment requiring flexible connection for adjustment or alignment (damp and wet locations).

5. Rigid Nonmetallic PVC Conduit:

a. Schedule 40 or Schedule 80 as indicated on the drawings.

1) Use for protection of primary feeders within transformer vaults.
2) Use for exterior branch circuits or feeders.
3) Use underground or under slab feeders or branch circuits.

6. Surface Metal Raceway: Use as exposed raceway system in finished spaces with existing CMU or concrete construction or at locations indicated on the drawings.

a. Use surface metal raceway system of size required for number of wires to be installed therein. Use specific size when indicated on the drawings.

b. Run raceway:

1) Along top of baseboards, care being taken to avoid telephone and other signal wiring.
2) Around door frames and other opening.
3) On ceiling or walls perpendicular to or parallel with walls and floor.

c. Where raceway crosses chair railing or picture molding, cut the chair railing or picture molding to permit the raceway to lie flat against the wall.

d. Do not run raceway through walls that have a plaster finish nor through masonry walls or floors. Install a pipe sleeve, or a short length of conduit with junction boxes or adapter fittings for raceway runs through such areas.

e. Secure raceway at intervals not exceeding 36 inches.

f. Install separate equipment grounding conductor for grounding of equipment. The raceway alone will not be considered suitable for use as an effective path to ground.

g. Outlet box covers for pendant mounted fluorescent fixtures may be omitted if the fixture canopy is notched to receive the raceway and the canopy fits snugly against the ceiling.

h. Where equipment is mounted on an outlet box and the equipment base is larger than the outlet box, provide finishing collar around equipment base and outlet box or provide finishing collar/outlet box:

1) Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.
2) Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base to be mounted thereon, gage or thickness of metal as required by NFPA 70, including provision for mounting and knockouts for entrance of raceway.

7. Wireways: May be used indoors in dry locations for exposed raceway between grouped, wall mounted equipment.

3.05 FITTINGS AND ACCESSORIES SCHEDULE

1. General:

a. Use fittings and accessories that have a temperature rating equal to, or higher than the temperature rating of the conductors to be installed within the raceway.

b. Use zinc electroplate or hot dipped galvanized steel/malleable iron or cast iron alloy fittings and accessories in conjunction with ferrous raceways in dry and damp locations unless otherwise specified or indicated on the drawings.

c. Use insulated grounding bushings or grounding wedges on ends of conduit for terminating and bonding equipment grounding conductors, when required, if cabinet or boxes are not equipped with grounding/bonding screws or lugs.

d. Use caps or plugs to seal ends of conduits until wiring is installed to exclude foreign material.

e. Use insulated grounding bushings on the ends of conduits that are not directly connected to the enclosure, such as stub-ups under equipment, etc., and bond between bushings and enclosure with equipment grounding conductor.

f. Use expansion fittings where raceways cross expansion joints (exposed, concealed, buried).

g. Use deflection fittings where raceways cross expansion joints that move in more than one plane.

h. Use 2 locknuts and an insulated bushing on end of each conduit entering sheet metal cabinet or box in dry or damp locations.

1) Plastic bushing may be used on 3/4 inch conduit in lieu of insulated bushing.
2) Terminate conduit ends within cabinet/box at the same level.

2. For Rigid Metal Conduit:

a. Use threaded fittings and accessories.

b. Use 3 piece conduit coupling where neither piece of conduit can be rotated.

3. For Electrical Metallic Tubing: Use compression type connectors and couplings.

4. For Flexible Metal Conduit: Use flexible metal conduit connectors.

5. For Liquid-tight Flexible Metal Conduit: Use liquid-tight connectors.

6. For Rigid Nonmetallic PVC Conduit:

a. Use conduit manufacturer's standard fittings and accessories.

b. Provide expansion fittings for exterior conduits as required by NFPA 70.

7. For Surface Metal Raceway: Use raceway manufacturer's standard fittings and accessories. Match raceway finish color.

8. For Wireways: Use wireway manufacturer's standard fittings and accessories.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260534 – OUTLET JUNCTION AND PULL BOXES

PART 1 – GENERAL

1.01 REFERENCES

A. NEMA, and UL.

1.02 SUBMITTALS

A. Product Data: Manufacturer's standard catalog sheets, specifications and installation instructions.

1.03 QUALITY ASSURANCE

A. Electrical components, conductors, devices and accessories described herein shall be listed and labeled as defined by NFPA 70 by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories (UL), for the intended use and shall bear its label.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL OUTLET BOXES

A. Provide standard galvanized steel boxes and device covers in compliance with NEMA OS1 And UL 514A by Appleton Electric Co., Beck Mfg./Picoma Industries, Cooper/Crouse-Hinds, Raco/Div. of Hubbell, or Steel City/T & B Corp or approved equal.

2.02 GALVANIZED STEEL JUNCTION AND PULL BOXES

A. Provide code gage, galvanized steel screw cover boxes in compliance with NEMA OS1 by Delta Metal Products Inc., Hoffman Enclosures Inc., Hubbell Wiegmann, Lee Products Co., or Rittal/Electromate or approved equal.

2.03 THREADED TYPE BOXES

A. Outlet Boxes:

1. For Dry, Damp Locations: Provide zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., or OZ/ Gedney Co.,or approved equal, with zinc electroplate steel covers to suit application.

2. For Wet Locations: Provide malleable iron or cast iron alloy boxes with hot dipped galvanized or other specified corrosion resistant finish in compliance with NEMA FB1 as produced by Cooper/Crouse-Hinds (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws, and malleable iron covers gasketed to suit application.

B. Junction And Pull Boxes:

1. For Dry, Damp Locations: Provide zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, or OZ/Gedney Co., or approved equal with zinc electroplate steel or cast iron cover.

2. For Wet Locations: Provide cast iron boxes in compliance with NEMA FB1 and UL 1773 by Cooper/Crouse-Hinds' (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), or approved equal, with stainless steel cover screws and cast iron cover gasketed to suit application.

C. Conduit Bodies, Threaded (Provided with a Volume Marking):

1. For Dry, Damp Location: Provide zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, or OZ/Gedney Co.'s Conduit Bodies or approved equal.

2. For Wet Locations: Provide malleable iron or cast-iron alloy bodies with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds' Condulets (hot dipped galvanized or Corro-free epoxy power coat), or OZ/Gedney Co.'s Conduit Bodies (hot dipped galvanized) or approved equal, with stainless steel cover screws and malleable iron covers gasketed to suit application.

2.04 CORROSION RESISTANT BOXES

A. Plastic Coated Outlet and Junction Boxes: Provide threaded type malleable iron boxes coated with 40 mils thick polyvinylchloride coating; Ocal/T&B Corp.'s Ocal-Blue System, PCD Inc.'s KorKap, KorKap XL, or Robroy Industries' Plastibond or Perma-Cote System or approved equal.

B. Non-Metallic Junction and Pullboxes: Glass fiber reinforced polyester; Carlon/Div. of Lamon and Sessions' Himeline Series, Cooper/Crouse-Hinds' Krydon Products, or Robroy Industries' Stahlin Enclosures or approved equal.

2.05 SPECIFIC PURPOSE OUTLET BOXES

A. As fabricated by manufacturers for mounting their equipment.

2.06 FINISHING COLLAR OR COMBINATION FINISHING COLLAR/OUTLET BOX (SURFACE MOUNTED EQUIPMENT USED WITH EXPOSED RACEWAY)

A. Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.

B. Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base, gage or thickness of metal as required by National Electrical Code, including provisions for mounting, and knockouts or threaded bosses for entrance of raceway.

2.07 FLOOR OUTLETS

A. For combination power and technology floor boxes and outlets – refer to Division 27.

B. Floor Outlet for Cast-In-Place Concrete Construction; Hubbell's Floor Boxes, Raco Inc.'s Tilt Top, or Steel City/T & B Corp.'s Floor Boxes:

1. Concrete tight galvanized steel boxes (for installation above grade).

2. Watertight cast iron boxes (for installation on or below grade).

3. Fully adjustable top (including 10-degree angular adjustment) before and after installation.

4. Service Fittings:

a. Above Floor: Aluminum, doghouse style, to suit power, service.
b. Flush Floor: Flush round cover with hinged lid (and carpet flanges for carpeted areas) to suit power service, finish to match hardware in area where installed.

2.08 OUTLET BOXES AND RELATED PRODUCTS FOR FIRE RATED CONSTRUCTION

A. For combination power and technology floor boxes and outlets – refer to Division 27.

B. Parameters For Use of Listed Metallic Outlet or Switch Boxes: UL Electrical Construction Equipment Directory - Metallic Outlet Boxes (QCIT).

C. Wall Opening Protective Materials: As listed in UL Fire Resistance Directory - Wall Opening Protective Materials (CLIV), or UL Electrical Construction Equipment Directory - Wall Opening Protective Materials (QCSN).

D. Floor Outlet Boxes:

1. Poke-Through System: As listed in UL Fire Resistance Directory - Outlet Boxes and Fittings Classified for Fire Resistance (CEYY), or UL Electrical Construction Equipment Directory - Outlet Boxes and Fittings Classified for Fire Resistance (QBWY).

2. Service Fittings:

a. Above Floor: Aluminum, doghouse style, to suit power service.
b. Flush Floor: Metallic flush round cover with hinged lid (and carpet flanges for carpeted areas) to suit power service, finish to match hardware in area where more installed.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide all boxes required to complete the raceway system, regardless of whether indicated or not on the drawings.

B. Provide boxes in sizes as required by Code.

C. Provide dividers in boxes where difference in insulation rating exceeds 300V.

3.02 PREPARATION

A. Before proceeding with the installation of junction and pull boxes, check the locations with the Owner’s Representative and have same approved.

3.03 INSTALLATION

A. Mounting Position of Wall Outlets for Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.

B. Height of Wall Outlets: Unless otherwise indicated, locate outlet boxes with their center lines at the following elevations above finished floor:

Lighting Fixtures	6’-0”
Lighting Fixtures in Stairway	7’-6”

Exit Lights	8’-0” where ceiling height allows a minimum of 6 inch clearance between ceiling and top of exit light. Otherwise mount exit light so that it’s top is 6 inches below finished ceiling. Adjust height and clearances as required to suit installation over doors.
Night Lights	2’-0”
Hose Cabinet Lights	1’-0” above top of cabinet
Switches	4’-0”
Single & Duplex Receptacles	1’-6”*
Water Cooler Receptacles	2’-0”
Clock Receptacles	7’-6”
Range Receptacle	1’-6”
Special Purpose Receptacles	4’-0”
Thermostats	5’-0”
Manual Fire Alarm Boxes	4’-0”
Audible Notification Appliances	8’-0” where ceiling height allows a minimum of 6 inch clearance between ceiling and top of appliance. Otherwise mount appliance so that it’s top is 6 inches below finished ceiling.
Visible Notification Appliances	Install outlet so that the bottom of the visible lens will be 6’-8” AFF.
Combination Audible/Visible Notification Appliances	Install outlet so that the bottom of the visual lens will be 6’-8” AFF, and the audible section will be above the visible section.
Radio	2’-0”
Television	2’-0”
Telecommunications	2’-0”
Telephone	2’-0”
Wall Handset Telephone.	Install outlet so that the highest operable part of the wall mounted telephone will not be more than 4’-0” AFF.

*In areas containing heating convectors, install outlets above convectors at height indicated on drawings.

C. Supplementary Junction and Pull Boxes: In addition to junction and pull boxes indicated on the drawings and required by NFPA 70, provide supplementary junction and pull boxes as follows:

1. When required to facilitate installation of wiring.
2. At every third 90 degree turn in conjunction with raceway sizes over 1 inch.
3. At intervals not exceeding 100 feet in conjunction with raceway sizes over 1 inch.

3.04 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

A. Boxes For Concealed Conduit System:

1. Non-Fire Rated Construction:

a. Depth: To suit job conditions and comply with NFPA 70 Article 370.
b. For Lighting Fixtures: Use galvanized steel outlet boxes designed for the purpose.

1) For Fixtures Weighing 50 lbs. or Less: Box marked “FOR FIXTURE SUPPORT”.
2) For Fixtures More Than 50 lbs: Box listed and marked with the weight of the fixture to be supported (or support fixture independent of the box).

c. For Ceiling Suspended Fans:

1) For Fans Weighing 35 lbs or Less: Marked “Acceptable for Fan Support.”
2) For Fans Weighing More Than 35 lbs, up to 70 lbs: Marked “Acceptable for Fan Support up to 70 lbs (or support fan independent of the box).”

d. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
e. For Switches, Receptacles, Etc:

1) Plaster or Cast-In-Place Concrete Walls: Use 4 inch or 4-11/16 inch galvanized steel boxes with device covers.
2) Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.

2. Recessed Boxes in Fire Rated (2 hour maximum) Bearing and Nonbearing Wood or Steel Stud Walls (Gypsum Wallboard Facings):

a. Use listed single and double gang metallic outlet and switch boxes. The surface area of individual outlet or switch boxes shall not exceed 16 square inches.
b. The aggregate surface area of the boxes shall not exceed 100 square inches per 100 square feet of wall surface.
c. Securely fasten boxes to the studs. Verify that the opening in the wallboard facing is cut so that the clearance between the box and the wallboard does not exceed 1/8 inch.
d. Separate boxes located on opposite sides of walls or partitions by a minimum horizontal distance of 24 inches. This minimum separation distance may be reduced when wall opening protective materials are installed according to the requirements of their classification.
e. Use wall opening protective material in conjunction with boxes installed on opposite sides of walls or partitions of staggered stud construction in accordance with the classification requirements for the protective material.

3. Other Fire Rated Construction: Use materials and methods to comply with the listing requirements for the classified construction.

B. Boxes For Exposed Conduit System:

1. Dry and Damp Locations: Use zinc electroplate or hot dipped galvanized threaded type malleable iron or cast-iron alloy outlet, junction, and pull boxes or conduit bodies provided with a volume marking in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.

a. Galvanized steel boxes may be used in conjunction with conduit sizes over 1 inch in non-hazardous dry and damp locations.
b. Galvanized steel boxes may be used in conjunction with electrical metallic tubing where it is allowed (specified) to be installed exposed as branch circuit conduits at elevations over 10’-0” above finished floor.

2. Wet Locations: Use threaded type malleable iron or cast iron alloy outlet junction, and pull boxes or conduit bodies (provided with a volume marking) with hot dipped galvanized or other specified corrosion resistant coating in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.

a. Use corrosion resistant boxes in conjunction with plastic coated rigid ferrous metal conduit.

3. Finishing Collar or Combination Finishing Collar/Outlet Box (Surface Mounted Equipment Used With Exposed Raceway):

a. Use finishing collar where surface mounted equipment is installed on an exposed raceway outlet box and the equipment base is larger than the outlet box.
b. Use combination finishing collar/outlet box where surface mounted equipment is not indicated to be installed on an exposed raceway outlet box, but raceway cannot be run directly into equipment body due to equipment design.

C. Specific Purpose Outlet Boxes: Use to mount equipment when available and suitable for job conditions. Unless otherwise specified, use threaded type boxes with finish as specified for exposed conduit system, manufacturer's standard steel (painted) boxes for surface metal raceway system and galvanized steel for recessed installations.

D. Stencil cover of pull boxes used on systems over 600 V, in white lettering minimum 1/2 inches high, the words "DANGER HIGH VOLTAGE - KEEP OUT".

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260543 – UNDERGROUND CABLE AND CONDUIT SYSTEMS

PART 1 – GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 033000 – Cast-In-Place Concrete
C. Section 260519 – Low Voltage Electrical Power Conductors and Cables
D. Section 310000 – Earthwork

1.02 SUBMITTALS

A. Product Data: Manufacturer's standard catalog sheets, specifications and installation instructions.

B. Unless noted otherwise, specific manufacturer's and / or model / part numbers indicated in this specification section, shall be interpreted as that "manufacturer and/or model / part number" or equal.

1.03 QUALITY ASSURANCE

A. Electrical components, conductors, devices and accessories described herein shall be listed and labeled as defined by NFPA 70 by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories (UL), for the intended use and shall bear its label.

PART 2 - PRODUCTS

2.01 GENERAL MATERIALS

A. Conductors and cables:

1. Underground conductors, for electric light and power, rated 600V or less, whether direct buried or in conduit, shall be listed for use in wet locations and shall conform to the requirements of Section 260519.

2. Underground cabling, rated 601 volts and above, shall be as specified on he Contract Drawings, and shall meet the requirements of the serving utility, where applicable.

B. Rigid Ferrous Metal Conduit: Steel, galvanized on the outside and inside (conduit enameled on the inside will not be accepted), UL categorized as Rigid Ferrous Metal Conduit (identified on UL Listing Mark as Rigid Metal Conduit-Steel or Rigid Steel Conduit), as manufactured by Allied Tube & Conduit Corp., LTV Steel Tubular Products Co., Triangle Wire & Cable Inc., or Wheatland Tube Co.

C. Rigid Nonmetallic Conduit and Fittings (Concrete Encased): Cantex, Inc.'s Schedule 40 or Schedule 80, Carlon Electrical Products Inc.'s Plus 40, CertainTeed Corp.'s Schedule 40, Omni/Opti-Com Manufacturing Network, Inc.'s Schedule 40 or Queen City Plastic Inc.'s Schedule 40 or Schedule 80.

D. Plastic Coated Rigid Metal Conduit, Fittings and Accessories: Rigid ferrous metal conduit, fittings

and accessories coated with 40 mils thick polyvinylchloride coating; Occidental Coating Co.'s Ocal 40, Protective Coatings Developments Inc.'s Kor-Kap, or Robroy Industries' Plastibond System.

E. Conduit Spacers and Levelers: Commercially manufactured type to suit conduit, installation and spacing requirements.

F. Duct Seal: Appleton Electric Co.'s DUC Weatherproof Compound, Manville Corp.'s Duxseal, OZ/Gedney Co.'s DUX, or Thomas & Betts Corp.'s DX.

G. Drag Line: Minimum 1/8-inch polypropylene monofilament utility rope; American Synthetic Ropes' Flotorope, Greenlee Tool Co.'s 2 ply Rope 431, or Thomas Industries/Jet Line Products' Rope 232.

H. Thru Wall Sealing Bushings:

1. For Walls Which Have or Will Have Membrane Waterproofing:

a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK thruwall seal and Type FSKA membrane clamp adapter.
b. Core Drilled or Sleeved Installations: OZ/Gedney Co.'s Type CSM and Type CSMC with membrane clamp adapter.

2. For Walls Which Will Not Have Membrane Waterproofing:

a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK.
b. Core Drilled or Sleeved Installations: OZ/Gedney Co.'s Type CSM, or Thunderline Corp.'s Link-Seal.

I. End Bells:

1. For Rigid Ferrous Metal Conduit: OZ/Gedney Co.'s Type TNS.

2. For Rigid Nonmetallic Conduit: Conduit manufacturer's standard end bells.

J. Insulated Grounding Bushings: Appleton Electric Co.'s GIB-50 Series, Crouse Hinds GLL Series, OZ/Gedney Co.'s IBC-50L Series, Raco Inc.'s 1212 Series, or Thomas & Betts Corp.'s 3870 or BG Series.

K. Underground Warning Tape:

1. Aluminum backed, 6-inch wide by 0.005-inch-thick underground warning tape with a Red background color (electric) or orange background color(telecommunications)as applicable.

2. Black lettering “CAUTION – BURIED ELECTRIC LINE BELOW” or “CAUTION – BURIED TELECOMMUNICATIONS LINE BELOW” as applicable.

2.02 POLYMER CONCRETE HANDHOLES AND BOXES WITH POLYMER CONCRETE COVER

A. Description: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. Manufacturers:

a. Armorcast Products Company
b. Carson Industries LLC
c. Oldcastle
d. Quazite: Hubbell Power Systems, Inc.

B. Standard: Comply with ANSI/SCTE 77.

C. Minimum design loads: Unless otherwise noted, minimum design loads shall meet ANSI/SCTE/77 Tier 22 Ratings: 22,500 lbs vertical design load and 800 lbs/sq.ft. lateral, tested at 150% Of the design loads.

D. Color of Frame and Cover: Gray.

E. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.

F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.

G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

H. Cover Legend: Molded lettering, "ELECTRIC."

I. Handholes 12 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

J. Provide divider to separate wiring with insulation levels exceeding 300V.

PART 3 - EXECUTION

3.01 PREPARATION

A. Obtain all required utility markouts as per State / Local Laws and Codes and as specified elsewhere in the project specifications. Maintain markings until no longer required.

B. Prior to installing any Work, lay out the proposed course for the conduits, location of manholes, etc. and have same approved by the Owner's Representative.

3.02 UNDERGROUND CONDUIT INSTALLATION

A. Spacing:

1. Arrangement for Power and Signal Service: Separate power system conduits from signal system conduits with minimum 6 inches thick concrete wall or 12 inches of earth.

2. Conduit Bank: Separate individual conduits a minimum of 3 inches. Use spacers and levelers located no more than 8 feet apart. Separators between tiers shall be staggered approximately 6 inches between tiers.

B. Depth:

1. Light and Power Cabling rated 600V and Below, Telecommunications, Fiber Optic, and other Low Voltage systems: Unless otherwise indicated or directed, install conduit at least 24 inches below finished grade to top of highest conduit.

2. Electric Light and Power Cabling Rated 601V and Higher: Unless otherwise indicated or directed, install conduit at least 36 inches below the finished grade to top of the conduit.

3. Crossing Obstructions: Use rigid ferrous metal conduit where top of conduit system is less than 18 inches below finished grade when crossing obstructions (heating tunnels, etc.).

4. In Rock:

    a. Unless otherwise indicated on the drawings install rigid ferrous metal conduit or concrete encased rigid nonmetallic conduit at depths previously specified. Backfill with suitable material in accordance with SECTION 310000 - EARTHWORK.
    b. Where conduit is indicated to be installed at lesser depths, use rigid ferrous metal conduit. Cover conduit with minimum 2 inches of concrete. In exposed rock area fill trench with concrete to surface level of rock. Where rock is not exposed, complete backfill in accordance with SECTION 310000 - EARTHWORK.

C. Pitch:

1. Pitch conduit away from buildings.

2. Pitch conduit toward manhole a minimum of 3 inches per 100 feet. On runs where it is impossible to maintain the grade all one way, grade from center so that conduits pitch both directions down toward manholes.

D. Concrete Encasement for Rigid Non-Metallic Conduit Using Either of the Two Methods Indicated Below: (Concrete Encasement for Rigid Ferrous Metal Conduit is not Required):

1. Single Pour Method:

    a. Concreting Sequence: Pour each run of envelope between handholes or other terminations in one continuous operation.

        1) Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations or use other specific measures to prevent expansion-contraction damage.
        2) If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch (19-mm) reinforcing rod dowels extending 18 inches (450 mm) into concrete on both sides of joint near corners of envelope.

    b. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in the middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.
    c. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
    d. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
    e. Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

        1) Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete.
        2) Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.

2. Two Pour Method:

a. Lay rigid nonmetallic conduits on a continuous concrete footing not less than 3 inches thick and as wide as the encasement. Install footings straight and true both in line of run and transversely and finished with an even surface. Incorporate anchoring devices into the footing for use in tying down the conduits. Grade footings so that conduits maintain required pitch. Before installing spacers, levelers, and conduits, let concrete footings harden as required to prevent damage to the footings.

1) Where conduits enter building or manhole wall, reinforce footings for 10 feet with No. 4 rods, 4 inches on center.
2) Footings are not required for rigid ferrous metal conduit.

b. After rigid nonmetallic conduits have been laid on footing with spacers and levelers (located no more than 8 feet apart), tie conduits down to the footing, then surround the conduits by concrete not less than 2 inches thick on top and 2 inches on each side. Separate individual conduits a minimum of 3 inches so that each conduit is completely enveloped in concrete.

1) Where conduits enter building or manhole walls, reinforce encasement for 10 feet with No. 4 rods, 4 inches on center.
2) Encasement is not required for rigid ferrous metal conduit.

c. Form sides of the concrete encasement. Exception: Earth cuts will be permitted as the form where trenches are neatly excavated in stable soils.

E. Jacking Conduits: Rigid ferrous metal conduit may be jacked under roads, parking lots, etc. Submit jacking details for approval.

F. Conduits Entering Buildings and Manholes:

1. Seal conduit entrances into manholes watertight.

2. Seal conduit entrances into building walls watertight. Exception: Seal is not required in below grade foundation walls associated with slab on grade construction.

3. Install end bells at conduit entrances into manholes.

4. Install end bells at conduit entrances into buildings. Exceptions:

a. Install insulated grounding bushing on conduit entrance stub up associated with slab on grade construction.
b. Install insulated grounding bushing and 2 locknuts on conduit where conduit is terminated in cabinet, junction or pull box.

G. Cleaning Conduits: Take precautions to prevent foreign matter from entering conduits during installation. After installation clean conduits with tools designed for the purpose.

H. Conduit for Future Use (Spare Conduit and Empty Conduit): Demonstrate to the Owner's Representative that conduits installed for future use are clear of obstructions (draw mandrel 1/2 inch less in diameter than conduit). Install a drag line in each conduit.

I. Sealing Ends of Conduits:

1. Occupied Conduits: Seal ends of conduits to be used for Work of this contract until cables are to be installed. After cable installation, seal conduits at building entrances and first manhole outside building. Seal with duct seal.

2. Conduits For Future Use: Seal the ends of spare and empty conduits at building entrances

and manholes. Seal with plastic plugs or a contrasting color cement/sand mixture.

J. Using Existing Underground Conduits: Clean the conduits with tools designed for the purpose. The condition of conduits after cleaning may be determined with a mandrel 1/2 inch less in diameter than the conduit, with the sheath painted with black lacquer. Pull mandrel through conduit. Conduit is acceptable when there are no roller marks or scratches on the mandrel. Other methods may be used if approved. Report and demonstrate to the Director's Representative any defect found in the conduit system that cannot be eliminated. The Contractor is held responsible for any damage to cables resulting from imperfections in the conduit.

K. Underground Warning Tape:

1. Apply over all direct buried cable and underground conduit runs.

2. Run tape parallel to, and 12” above, cable or conduit run centerline.

3. Where ductbank exceeds 18” inches in width, provide additional tape runs 12” apart for each additional 12” in width.

L. Cable Installation:

1. Grounding: Provide an equipment ground conductor, sized per Contract Drawings or NFPA 70 (whichever is greater), in all new underground electric light and power cable runs. Do NOT rely on metallic conduits or cable armor to serve as equipment ground.

2. Cable Pulling: Clean conduits prior to installation of cables as described herein. Do not exceed manufacturer’s recommended maximum pulling tensions.

3. Underground Cable Splices:

a. Underground cables splices shall be made only where called for on the drawings, cable taps, or where otherwise absolutely necessary. Pull through intermediate handholes/ manholes.
b. Use only splice kits listed for underground use.
c. Splices shall be made in approved handholes / manholes only. Direct buried splices or splices pulled into conduits are NOT permitted.

3.03 CONDUIT SCHEDULE - TYPES AND USE

A. Rigid Ferrous Metal Conduit: Install in all locations unless otherwise specified or indicated on the drawings.

B. Rigid Nonmetallic Conduit (Concrete Encased): May be installed in all locations except:

1. Where conduit stubs up or rises through slab or finished grade.

2. Where other type raceways are specified or indicated on the drawings.

C. Rigid Nonmetallic Conduit (Direct Buried) Schedule 80 PVC: May be Installed in all locations unless otherwise specified or indicated on the drawings.

D. Rigid Nonmetallic Conduit (Direct Buried) Schedule 40 PVC: May be installed in unpaved areas when so specified in the drawings.

3.04 HANDHOLE INSTALLATION

A. Do NOT install polymer concrete handholes in areas subject to deliberate vehicular traffic unless specifically rated and listed for this use.

B. Handholes and boxes shall be set level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Provide box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.

C. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

D. In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

F. Field cut openings for duct according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

G. For enclosures installed in asphalt paving and subject to occasional, non-deliberate, heavy- vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame.

   1. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Section 033000 "Cast-in- Place Concrete," with a troweled finish.

   2. Dimensions: 10 inches wide by 12 inches deep.

3.05 RESTORATION

A. Backfill, compact and restore trench to final or existing grades as per Contract Drawings and as per Section 31000 – Earthwork.

B. Seed// sod grassy areas as per Section 31000 – Earthwork.

C. Where final grading and paving are NOT being performed by other trades:

   1. Restore all disturbed paving to match adjacent existing conditions or better.

   2. Restore disturbed concrete walk flags in their entirety. Match adjacent grades.

   3. Restore disturbed curbing to match adjacent curbing.

   4. Restore any disturbed traffic and paving markings.

   5. Paved areas shall be swept clean of all spoils and debris removed from site.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All sections of the project manual are directly applicable to this specification section. Should a conflict arise between specification sections or between specifications and drawings and/or code requirements, the contractor shall notify the Architect/Engineer of the conflict in writing. If direction is not provided prior to the submission of the bid, the contractor shall price the more extensive system.

1.02 SUMMARY

A. Clearly and properly identify the complete electrical system to indicate the loads served or the function of each item of equipment connected under this work.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145 for danger, caution or safety instruction signs.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 LABELS

A. Pre-Printed: Permanent material pre-printed with black on white, with adhesive backing. Brady, 3M, or equal.

B. Laminated Plastic: 3-ply laminated plastic, color as indicated, with 1/2-inch high white letters for low voltage. Lamicoid, or equal.

C. Identification Plates: Engraved Phenolic/Lamacoid plastic, 1/16” thick, ASTMD 709 Type 1, black with white letters or white with black letters.

D. Plastic Tape: Black or red with white letters, adhesive backing, field-printed with proper tool. Dymo-tape, or equal.

E. Marker Tape: Clear adhesive-backed tape with black letters, for device plates. Kroy, or equal.

F. Wire Markers: White with black numbers, adhesive-backed tape on dispenser roll. Brady, 3M, or equal.

G. Marker Pen: Black permanent marker suitable for writing on metallic surfaces.

2.03 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal Size: 7 by 10 inches.

4. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlton Industries, LP
   b. Champion America
   c. Marking Services, Inc.
   d. Approved Equal.

B. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.

2. Thickness:

   a. For signs up to 20 sq. inches, minimum 1/16-inch-.
   b. For signs larger than 20 sq. inches, 1/8 inch thick.
   c. Engraved legend with colors as indicated below by type of service:

      1) Normal Power – Black background with white letters.
      2) Standby Power- Blue background with white letters.
      3) Emergency/Life Safety Power- Red background with white letters.
      4) UPS/Clean Power – Gray background with white letters to read “UPS POWER” or “CLEAN POWER.”

   d. Punched or drilled for mechanical fasteners.
   e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Brady Corporation
   b. Carlton Industries, LP
   c. Marking Services, Inc.
   d. Approved Equal

2.04 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, #404 stainless-steel screws.

PART 2 – EXECUTION

3.01 GENERAL

A. Prior to applying adhesive identification products, clean and prepare surfaces as recommended by manufacturer of identification product.

B. Verify each item to be identified prior to application. Verify and coordinate all labelling information, colors etc. with the Drawings, Shop Drawings, manufacturer's wiring diagrams and manuals etc. and any special Owner labelling requirements. Labelling shall be consistent throughout Project.

C. Install any labelling prior to installing acoustical ceilings or other concealment.

D. Apply identification devices to surfaces that require finish after completion of finish work.

E. Identification materials and devices shall not interfere with operation and maintenance of equipment.

F. Attach signs and plastic labels that are not self-adhesive type with stainless steel mechanical fasteners appropriate to the location and substrate.

G. Wraparound Marker Labels and Metal Tags shall be secured tight to surface of conductor or cable at a location with high visibility and accessibility.

H. Labeling Instructions:

1. Indoor Equipment: Non-ferrous metal or rigid plastic, stamped, embossed or engraved identification plates shall have white letters on black face or vice versa. Unless otherwise indicated, provide a single line of text with 1/8-inch- high letters on 1-1/2-inch- high label; where multiple lines of text are required, increase height accordingly.

2. Outdoor Equipment: Engraved, laminated acrylic or melamine label.

3. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

4. Labels not using self-adhesive attachment, shall be fastened using appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

3.02 IDENTIFICATION SCHEDULE

A. General

1. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

   a. Comply with 29 CFR 1910.145.
   b. Identify system voltage with black letters on an orange background.
   c. Apply to exterior of door, cover, or other access.
   d. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

      1) Power-transfer switches.
      2) Controls with external control power connections.

2. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
3. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

B. Low Voltage Switchgear

1. Label each switchgear section with laminated plastic label indicating switchgear name and section per the drawings / shop drawings, ampere rating, voltage. Indicate source from switch switchboard is fed and feeder size on incoming feeder section.

2. Label all protective devices with laminated plastic labels indicating the function or the load served.

3. Provide laminated plastic labels for all bussed spaces indicating the maximum ampere rating or size of future breaker or switch that may be installed in the space reserved.

C. Branch Circuit and Power Distribution Panelboards:

1. Provide laminated plastic labels on panel exterior which indicate panel name per the drawings, voltage, source, from which the panel is fed with laminated plastic labels attached to face trim. Indicate feeder source, feeder wire size, and feeder breaker or fuse size with marker tape or marker pen on the inside of the panel door.

2. For new or modified panelboards, provide typewritten or software generated panel directories, with protective, clear transparent covers, accurately accounting for every breaker installed, including spares. Schedules shall use the actual loads and room designations assigned by name or number near completion of the work. Do not use the designations from the drawings.

3. For power distribution panelboards, where no directory is present, label each protective device with laminated plastic labels indicating load served. Marker pen is permitted where space does not permit laminated plastic labels.

D. Motor Control Centers:

1. Label all motor control centers with laminated plastic labels indicating control center name per the drawings.

2. Label all starters and breakers with factory-provided labels or laminated plastic labels indicating the function or the load served and location.

3. Provide pre-printed labels for all spaces.

E. Transformers:

1. Label all transformers with identification plate indicating equipment label per the drawings, KVA, primary and secondary voltages, source, and load served.

F. Disconnect Switches

1. Label All Disconnect Switches with laminated plastic labels indicating device name per the drawings, and with permanent marker, the source, load served, and internal fuse size, if applicable.

G. Miscellaneous Equipment

1. Label all motor start switches, individual circuit breakers, relays, contactors, time switches, and indicating equipment with marker tape or laminated plastic labels indicating equipment number, source, and circuit number.

2. Where the controlling device is remote mounted from the serving panel, include the serving panel designation and circuit number with additional plastic tape labels.

H. Receptacles

1. All receptacle plates shall be marked in marker tape on the face of the plate, with the receptacles panel and branch circuit designation. The identification shall be made with clear self-adhesive tape with black 10-point letters. Apply the tape at the top of the device plate.

2. Receptacles connected to a GFCI-protected circuit downstream from the protecting device shall be labeled “GFCI Protected.”

I. Outlet, Pull, And Junction Boxes

1. For exposed and those above suspended ceilings, label covers of power junction boxes neatly by hand using permanent marker, indicating source and circuit number.

2. For exposed ceilings in occupied public spaces, where conduits, junction boxes, etc. are to painted to blend into the ceiling, provide aforementioned labelling on the inside cover of the junction box.

J. Conduits

1. Label all exposed conduit runs in non-public spaces or accessible ceiling spaces with source panel and circuit number using neatly written using permanent marker. Include destination in labelling for all feeder conduits Space labels a maximum of 50 feet apart and at least one per room. Label conduits at entrances of all “J” boxes, distribution panels, MCC, panelboards, etc.

2. Omit labelling exposed conduits in occupied public spaces.

K. Emergency Lighting Fixtures:

1. Ceiling mounted and wall mounted emergency light which are equipped with integral emergency back-up battery or are tied into an emergency power system (emergency generator, remote inverter, etc.), shall be readily identified with a ¾” dia. red circular adhesive label either on the fixture or on the ceiling grid surrounding the fixture.

2. Exceptions:

   a. Twin head battery pack emergency unit fixtures and
   b. Fixtures equipped with integral emergency battery with an indicator LED clearly visible without removing any lensing.

L. Special Systems (Fire Alarm, Security, Pa, Etc.): subject to the provisions of the respective specification section for each system:

1. Equipment Cabinets, Terminal Cabinets, Power Supply Cabinets, Control Panels, Patch Panels, Racks:

   a. Provide identification plates with equipment identification as indicated on the drawings.

b. Label termination blocks and ports.

2. Pullboxes, Enclosures, Junction Boxes:

   a. Provide identification plate including system type and location designation, if any, per the Drawings or Shop Drawings on cover.
   b. Indicate equipment and location(s) from which enclosed cables originate.

3. Fire Alarm:

   a. Fire alarm junction boxes shall be red unless another standard is used be owner.
   b. Initiation Devices, Notification Appliances, Fire Alarm Relays – Provide zone or address identification label, clear Marker Tape, red or black letters.
   c. Remote Smoke Detector Lamps and Test Stations – Provide label indicating the location of the connected device.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260573 – SHORT-CIRCUIT/COORDINATION STUDY/ARC FLASH HAZARD ANALYSIS

PART 1 – GENERAL

1.01 SCOPE

A. The contractor shall furnish short-circuit and protective device coordination studies which shall be prepared by the equipment manufacturer.

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.5 and Informative Annex D.

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems
6. IEEE 1584 – Guide for Performing Arc-Flash Hazard Calculations

B. American National Standards Institute (ANSI):

1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories
5. ANSI C37.5 – Methods for Determining the RMS Value of a Sinusoidal Current Wave and Normal-Frequency Recovery Voltage, and for Simplified Calculation of Fault Currents

C. The National Fire Protection Association (NFPA)

1. NFPA 70 - National Electrical Code, latest edition
2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.03 SUBMITTALS FOR REVIEW/ APPROVAL

A. The short-circuit and protective device coordination studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from the engineer may be obtained for preliminary submittal of sufficient study data to ensure that the selection of device and characteristics will be satisfactory.

1.04 SUBMITTALS FOR CONSTRUCTION

A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. No more than five (5) bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than five (5) copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Additional copies, where required, shall be provided on CD in PDF format.

B. The report shall include the following sections:

1. One-line diagram showing protective device ampere ratings and associated designations, cable size & lengths, transformer kVA & voltage ratings, motor & generator kVA ratings, and switchgear/switchboard/panelboard designations.

2. Descriptions, purpose, basis and scope of the study.

3. Tabulations of the worst-case calculated short circuit duties as a percentage of the applied device rating (automatic transfer switches, circuit breakers, fuses, etc.); the short circuit duties shall be upward-adjusted for X/R ratios that are above the device design ratings.

4. Protective device time versus current coordination curves with associated one line diagram identifying the plotted devices, tabulations of ANSI protective relay functions and adjustable circuit breaker trip unit settings.

5. Multi-function relay setting file printouts including all ANSI protective relay functions and associated logic and control. Metering, communication, and control logic settings not associated with ANSI protective functions are not required.

6. Fault study input data, case descriptions, and current calculations including a definition of terms and guide for interpretation of the computer printout.

7. Incident energy and flash protection boundary calculations.

8. Comments and recommendations for system improvements, where needed.

9. Executive Summary including source of information and assumptions made.

1.05 QUALIFICATIONS

A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies. The Registered Professional Electrical Engineer shall be a full-time employee of the Engineering Services Organization.

PART 2 – PRODUCTS

2.01 STUDIES

A. Contractor to furnish short-circuit and protective device coordination studies as prepared by distribution equipment manufacturer or Licensed Professional Engineer. By using the equipment manufacturer, the study allows coordination of proper breakers, fuses, and current transformers. The coordination study shall begin with the utility company’s feeder protective device and include all of the electrical protective devices down to and include the largest feeder circuit breaker and motor starter in the 480 Volt motor control centers and power distribution panelboards. The study shall also include variable frequency drives, harmonic filters, power factor correction equipment,

transformers and protective devices associated with variable frequency drives, emergency and standby generators associated paralleling equipment and distribution switchgear.

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.5 and Informative Annex D.

C. Manual calculations are unacceptable. Subject to compliance with requirements, provide products by one of the following:

1. CGI CYME.
2. EDSA Micro Corporation
3. ESA Inc.
4. Operation Technology, Inc.
5. Power Analytics Corporation
6. SKM Systems Analysis, Inc.

D. Analytical features of the fault current-study computer software program shall include “mandatory”, “very desirable”, and “desirable” features as listed in IEEE 399.

E. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:

a. Arcing faults.
b. Simultaneous faults.
c. Explicit negative sequence.
d. Mutual coupling in zero sequence

2.02 DATA COLLECTION

A. Contractor shall furnish all field data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to eliminate unnecessary delays and assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Source combination may include present and future utility supplies, motors, and generators.

C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner or Contractor.

D. Include fault contribution of existing motors in the study, with motors < 50 hp grouped together. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

A. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standards 141, latest edition.

B. Transformer design impedances and standard X/R ratios shall be used when test values are not available.

C. Provide the following:

1. Calculation methods and assumptions.
2. Selected base per unit quantities.
3. One-line diagram of the system being evaluated with available fault at each bus, and interrupting rating of devices noted.
4. Source impedance data, including electric utility system and motor fault contribution characteristics.
5. Typical calculations.
6. Tabulations of calculated quantities.
7. Results, conclusions, and recommendations.

D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:

1. Electric utility's supply termination point.
2. Incoming switchgear.
3. Unit substation primary and secondary terminals.
4. Low voltage switchgear.
5. Motor control centers.
6. Standby generators and automatic transfer switches.
7. Branch circuit panelboards.
8. Other significant locations throughout the system.

E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

F. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short circuit ratings.
2. Adequacy of switchgear, motor control centers, and panelboard bus bracing to withstand short-circuit stresses.
3. Adequacy of transformer windings to withstand short-circuit stresses.
4. Cable and busway sizes for ability to withstand short-circuit heating.
5. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves shall be graphically displayed on log-log scale paper.

B. Include on each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.

D. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the curve sheets, where applicable:

1. Electric utility's protective device.
2. Medium voltage equipment relays.

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.
5. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters.
6. Conductor damage curves.
7. Ground fault protective devices, as applicable.
8. Pertinent motor starting characteristics and motor damage points.
9. Pertinent generator short-circuit decrement curve and generator damage point.
10. Other system load protective devices for the largest branch circuit and the largest feeder circuit breaker in each motor control center.

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

G. Select each primary protective device required for a delta-wye connected transformer so that the characteristics or operating band is within the transformer parameters which includes a parameter equivalent to 58% of the ANSI withstand point to afford protection for secondary line-to-ground faults.

H. Separate low voltage power circuit breakers from each other and the associated primary protective device by a 16% current margin for coordination and protection in the event of secondary line-to-line faults.

I. Engineer shall provide settings file printouts for all multifunction relays supplied under this contract including all ANSI protective relay functions and associated logic and control. Metering, communication, and control logic settings not associated with ANSI protective functions are not required.

2.05 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2012, Informative Annex D.

B. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Alternative methods shall be presented in the proposal.

C. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.

D. The Arc-Flash Hazard Analysis shall include all MV, 575v, & 480v locations and significant locations in 240 volt and 208-volt systems fed from transformers equal to or greater than 125 kVA.

E. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm^2.

F. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

G. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.

H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

2.06 REPORT SECTIONS

A. Input Data:

1. Utility three-phase and line-to-ground available contribution with associated X/R ratios
2. Short-circuit reactance of rotating machines with associated X/R ratios
3. Cable type, construction, size, # per phase, length, impedance and conduit type
4. Bus duct type, size, length, and impedance
5. Transformer primary & secondary voltages, winding configurations, kVA rating, impedance, and X/R ratio.
6. Reactor inductance and continuous ampere rating
7. Aerial line type, construction, conductor spacing, size, # per phase, and length.

B. Short-Circuit Data:

1. Source fault impedance and generator contributions
2. X to R ratios
3. Asymmetry factors
4. Motor contributions
5. Short circuit kVA
6. Symmetrical and asymmetrical fault currents

C. Recommended Protective Device Settings:

1. Phase and Ground Relays:
   a. Current transformer ratio.
   b. Current setting.
   c. Time setting.
   d. Instantaneous setting.
   e. Specialty non-overcurrent device settings.
   f. Recommendations on improved relaying systems, if applicable.

2. Circuit Breakers:
   a. Adjustable pickups and time delays (long time, short time, ground).
   b. Adjustable time-current characteristic.
   c. Adjustable instantaneous pickup.
   d. Recommendations on improved trip systems, if applicable.

D. Incident energy and arc flash boundary calculations.

1. Arcing fault magnitude
2. Device clearing time.
3. Duration of arc
4. Arc flash boundary
5. Working distance
6. Incident energy
7. Recommendations for arc flash energy reduction

PART 3 – EXECUTION

3.01 FIELD ADJUSTMENT

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

C. Notify Owner in writing of any required major equipment modifications.

D. Following completion of all studies, acceptance testing and startup by the field engineering service division of the equipment manufacturer, a 2-year warranty shall be provided on all components manufactured by the engineering service parent manufacturing company.

3.02 ARC FLASH WARNING LABELS

A. The vendor shall provide a 4 in. x 4 in. thermal transfer type label of high adhesion polyester for each work location analyzed.

B. The label shall have an orange header with the wording, “WARNING, SHOCK & ARC FLASH HAZARD”, and shall include the following information:

1. Location designation
2. Nominal voltage
3. Arc flash boundary
4. Incident energy
5. Working distance
6. Shock Boundaries
7. Engineering report number, revision number and issue date

C. Labels shall be machine printed, with no field markings.

D. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.

1. For each 600, 480 and applicable 208-volt panelboards and disconnects, one arc flash label shall be provided.
2. For each motor control center, one arc flash label shall be provided.
3. For each low voltage switchboard, one arc flash label shall be provided.
4. For each switchgear, one flash label shall be provided.
5. For medium voltage switches one arc flash label shall be provided

E. Labels shall be field installed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

3.03 ARC FLASH TRAINING

A. The equipment vendor shall train personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Maintenance procedures in accordance with the requirements of NFPA 70E, Standard For Electrical Safety Requirements For Employee Workplaces, shall be provided in the equipment manuals. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET).

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260810 – MANDATORY UL PARTICIPATION

PART 1 – GENERAL

1.01 SCOPE

A. This section addresses a mandatory site survey of electrical power panel retrofits and/or switchgear bus taps when such work is performed. The contractor shall engage the services and pay related fees of the UL field evaluation group (ULFE), or a similar firm engaging is this type of work on a regular basis.

1.02 TIMELINE

A. The contractor is advised that UL field evaluation response time is generally one to two weeks.

1.03 REGULATORY REQUIREMENTS

The specific issues addressed in panel retrofits are:

A. Panelboard interiors not marked for use in the existing back box revert to a 10 K AIC rating. If higher AIC rating is required per the project specifications and/or drawings, ULFE shall determine the actual AIC rating of the new panelboard interior back box combination, in conformance with original parameters.

B. ULFE shall specify corrective steps as required to achieve code compliance and meet the original engineering design intent. The cost of such corrective work shall be paid for by electrical contractor as part of this project.

1.04 ULFE WORK

A. ULFE shall field examine proposed bus taps for compliance with bus mechanical and power capacity ratings. They shall specify corrective actions as required.

1.05 RESPONSIBILITY

A. The contractor shall coordinate with the owner and utility company to minimize down time of electrical service for ULFE work. All electrical service outages shall be done as specified by the owner and utility company. Premium time fees if apply shall be the responsibility of the contractor.

1.06 SUBMITTALS

A. The ULFE response and related contractor response shall be part of the project final closeout submission.

1.07 UL CONTACT INFORMATION

Program Manager
Chuck Mello
877-854-3577, ext. 55578
chuck.mello@ul.com

Staff Engineer Bob Starasinich 847-224-0852
robert.m.starasinich@ul.com

Field Evaluation Service http://www.ul.com/global/eng/pages/offerings/services/globalfieldservices/fieldservices/fieldevaluationservices/

1.08 UL FIELD EVALUATIONS PROJECT DATA SHEET:

Field Evaluations Project Data Sheet

Date	

Person Contacting UL	
Title:	

Applicant Information
(Company that assumes financial obligation for the cost of the project)

Legal Company Name **Address** **City, ST, Zip**	

Taxpayer Identification Number (TIN)	
Phone No:	
Fax No:	
Cell No:	
E-Mail:	

Requested Date for FE to start	

Preliminary Field Evaluation Site (optional if requested)
(Usually taking place at the manufacturers location prior to being installed)

Company Name Address City, ST, Zip	
Contact on Site	
Phone No:	
Cell No:	
Are there any security steps necessary for the engineer to be on site (background check, NDA, ETC)	
Are there any specific safety policies we need to be aware of? (Personal Protective Equipment, Fall Protection, Required Safety classes, ETC)	

Final Installation Site
(Where the product is permanently installed & label applied)

Company Name Address City, ST, Zip	

Contact on Site	
Phone No:	
Cell No:	
Are there any security steps necessary for the engineer to be on site (background check, NDA, ETC)	
Are there any specific safety policies we need to be aware of? (Personal Protective Equipment, Fall Protection, Required Safety classes, ETC)	

Authority Having Jurisdiction
Local City / County Electrical Inspector (This is Mandatory)

AHJ Jurisdiction Address City, ST, Zip	
Name of Inspector	
Phone No:	
Fax No:	
Cell No:	
E-Mail:	

Equipment Information on Following Page

List of Equipment to be evaluated

Product Description & purpose	
Number of Units	
Manufacturer Name:	
Model Number:	
Serial Number:	
Volts & Amps Ratings	Voltage, A or FLA, Phase, Wire, (Hz), Power
Motor (how many & HP)	
Pending Litigation	Yes [ ] No [ ]
Hazardous Location:	Yes [ ] No [ ]
Equipment Condition:	New [ ] Used [ ]
Security/Signaling Equipment	Yes [ ] No [ ]
Product Under Current UL Evaluation	Yes [ ] No [ ]
Homeland Security Equipment	Yes [ ] No [ ]
E85 Gasoline Equipment	Yes [ ] No [ ]

Product Description & purpose	
Number of Units	
Manufacturer Name:	
Model Number:	
Serial Number:	
Volts & Amps Ratings	Voltage, A or FLA, Phase, Wire, (Hz), Power
Motor (how many & HP)	
Pending Litigation	Yes [ ] No [ ]
Hazardous Location:	Yes [ ] No [ ]
Equipment Condition:	New [ ] Used [ ]
Security/Signaling Equipment	Yes [ ] No [ ]
Product Under Current UL Evaluation	Yes [ ] No [ ]
Homeland Security Equipment	Yes [ ] No [ ]
E85 Gasoline Equipment	Yes [ ] No [ ]

Product Description & purpose	
Number of Units	
Manufacturer Name:	
Model Number:	
Serial Number:	
Volts & Amps Ratings	Voltage, A or FLA, Phase, Wire, (Hz), Power
Motor (how many & HP)	
Pending Litigation	Yes [ ] No [ ]
Hazardous Location:	Yes [ ] No [ ]
Equipment Condition:	New [ ] Used [ ]
Security/Signaling Equipment	Yes [ ] No [ ]
Product Under Current UL Evaluation	Yes [ ] No [ ]
Homeland Security Equipment	Yes [ ] No [ ]
E85 Gasoline Equipment	Yes [ ] No [ ]

Product Description & purpose	
Number of Units	
Manufacturer Name:	
Model Number:	
Serial Number:	
Volts & Amps Ratings	Voltage, A or FLA, Phase, Wire, (Hz), Power
Motor (how many & HP)	
Pending Litigation	Yes [ ] No [ ]
Hazardous Location:	Yes [ ] No [ ]
Equipment Condition:	New [ ] Used [ ]
Security/Signaling Equipment	Yes [ ] No [ ]
Product Under Current UL Evaluation	Yes [ ] No [ ]
Homeland Security Equipment	Yes [ ] No [ ]
E85 Gasoline Equipment	Yes [ ] No [ ]

Product Description & purpose	
Number of Units	
Manufacturer Name:	
Model Number:	
Serial Number:	
Volts & Amps Ratings	Voltage, A or FLA, Phase, Wire, (Hz), Power
Motor (how many & HP)	
Pending Litigation	Yes [ ] No [ ]
Hazardous Location:	Yes [ ] No [ ]
Equipment Condition:	New [ ] Used [ ]
Security/Signaling Equipment	Yes [ ] No [ ]
Product Under Current UL Evaluation	Yes [ ] No [ ]
Homeland Security Equipment	Yes [ ] No [ ]
E85 Gasoline Equipment	Yes [ ] No [ ]

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 262416 – PANELBOARDS

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the panelboards as specified and as shown on the contract drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 260500 – Common Work Results for Electrical
C. Section 260553 – Identification for Electrical Systems

1.03 REFERENCES

A. The panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:

1. UL 67 – Panelboards
2. UL 50 – Cabinets and boxes
3. NEMA PB1
4. Fed. Spec. W-P-115C
5. UL98 – Fusible Switches

1.04 SUBMITTALS – FOR REVIEW / APPROVAL

A. The following information shall be submitted to the Engineer for each panelboard:

1. Breaker layout drawing with dimensions indicated and nameplate designation.
2. Component list
3. Conduit entry/exit locations
4. Assembly ratings including:

    a. Short-circuit rating
    b. Voltage
    c. Continuous current

5. Cable terminal sizes
6. Product data sheets

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:

B. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process.

C. Installation information

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.07 REGULATORY REQUIREMENTS

A. Panelboard overcurrent protective devices shall be selectively coordinated with all supply side overcurrent protective devices as required for this project by the National Electrical Code/NFPA 70 Articles 645.27, 700.27, 701.27 and 708.54.

B. The panelboards and components shall be UL labeled.

1.08 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.09 OPERATION AND MAINTENANCE MANUAL

A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Subject to requirements, provide product by one of the following:

1. Eaton
2. Siemens
3. General Electric
4. Square D
5. Approved Equal

    a. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Ratings.

B. Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings or panelboard schedules, but not less than 22,000 amperes RMS symmetrical.

C. Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings or panelboard schedules, but not less than 14,000 amperes RMS symmetrical.

D. Panelboards shall be labeled with a UL short-circuit rating. Series rated panelboards shall be provided with a label or manual stating the conditions of the UL series ratings. Information in the manual shall include, at minimum:

1. Size and type of upstream device
2. Branch devices that can be used
3. UL tested and listed series short-circuit rating.

2.02 CONSTRUCTION

A. Interiors shall be completely factory assembled. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

B. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Door-in-door trim shall be provided. Both hinged trim and trim door shall utilize three-point latching. No tools shall be required to install or remove trim. Trim shall be equipped with a door-actuated trim locking tab. Equip locking tab with provision for a screw such that removal of trim requires a tool, at the owner's option. Installation shall be tamper resistant with no exposed hardware on the panelboard trim.

C. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.

D. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.

E. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.

F. All locks shall be keyed alike.

2.03 BUS

A. Main bus bars shall be tin-plated copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.

B. A system ground bus shall be included in all panels.

C. Full-size (100%-rated) insulated stand-off neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

2.04 BRANCH CIRCUIT PANELBOARDS – CIRCUIT BREAKER

A. The minimum short-circuit rating for branch circuit panelboards shall be 10,000 amperes symmetrical at 240 volts, and 14,000 amperes symmetrical at 480 volts, or as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Eaton type Pow-R-Line 1a, Pow-R-Line 2a or Pow-R-Line 3a or approved equal.

B. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

C. All circuit breakers shall be thermal-magnetic type with common handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame. Ratings through 100-ampere trip shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.

D. Circuit breaker handle locks (ON position) shall be provided for all circuits that supply exit signs, emergency lights, energy management, and control system (EMCS) panels and fire alarm panels.

2.05 BRANCH CIRCUIT PANELBOARDS – FUSIBLE

A. The minimum short-circuit rating for branch circuit panelboards shall be as specified herein or as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Eaton type Pow-R-Line 3FQS, Bussman Type QSCP, or engineer approved equal.

B. Panelboard shall have an integrated spare fuse compartment for up to (6) spare CUBE fuses as standard.

C. Branch circuit disconnecting means shall be bolt-on Bussmann Type CCPB with Bussmann Low-Peak CUBE fuses or approved equal utilized for overcurrent protection. Ratings shall be available from 15-100A with minimum interrupting rating of 300kA symmetrical and 200kA short circuit current assembly rating.

D. Branch circuit devices shall include a non-defeatable interlock to prevent removal of fuse under load. Provide a fuse ampacity rejection feature to prevent over fusing of branch disconnect. Fuses shall be indicating type with permanently installed neon indicating light. Branch devices shall be finger-safe when panelboard trim is removed. Provide lockout/tagout provision for each branch circuit position.

2.06 DISTRIBUTION PANELBOARDS – CIRCUIT BREAKER TYPE

A. Distribution panelboards equipped with bolt-on devices shall have interrupting ratings as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Eaton type Pow-R-Line 3a or Pow-R-Line 4B or approved equal. Panelboards shall have molded case circuit breakers as indicated below.

B. Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.

C. Main breakers, if furnished, shall be equipped with microprocessor-based trip units that have integral Arc Flash Reduction trip feature. The use of zone selective interlocking to emulate this function does not meet the intent of this specification and will not be allowed.

D. Distribution circuit breakers shall be fixed mounted type and equipped with either microprocessor-based trip units or thermal magnetic trip units as scheduled on the contract drawings.

E. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

2.07 DISTRIBUTION PANELBOARDS – FUSIBLE SWITCH TYPE

A. Distribution panelboards shall be equipped with main and branch fusible switches and include fuses with ratings indicated on the drawings. Fusible distribution panelboards shall be Eaton type Pow-R-Line 4F or approved equal.

2.08 PANELBOARD SUBMETERING

A. Where shown on the drawings, supply a UL listed microprocessor-based Multi-Point Metering System (MPM), Eaton type PX Multipoint Meter or approved equal having the specified features.

B. MPM shall have 60 channels for current sensor input. Meter shall auto-detect sensor rating and have standard tamper detection.

C. MPM shall calculate power and energy consumption in accordance with ANSI C12.20 (0.5%) metering specification and store metered data in nonvolatile memory.

D. MPM shall store the following per phase and system total for each metering point.

1. Voltage, Current, and Frequency (system total only)
2. Watts, VAR, VA, and power factor
3. Watt hours including forward and reverse.

E. MPM shall store energy profile information for each metering point in non-volatile memory. The demand profile time period shall be adjustable from 1, 5, 15, 30 and 60 minutes for fixed method and 1, 5, and 15 minutes for sliding method. The MPM shall have the ability to sync with external input to the on-board demand input. The MPM shall be able to save a minimum of 1 year of load profile data for all 60 meter points on a 15 minutes basis.

F. MPM shall be provided with multiple communications ports and protocols, including the following capability:

1. RS-485 remote display port
2. RS-485 Modbus RTU
3. USB Local Configuration Port
4. HTML web pages
5. File transfer protocol (ftp)
6. RJ-45 10/100Base-T Ethernet network port
7. Modbus TCP
8. BACnet/IP
9. SMTP(Simple Mail Transfer Protocol) for email support
10. SNMP(Simple Network Management Protocol) MIB support
11. Ethernet TCP/IP
12. NTP(Network Time Protocol) support

2.09 SURGE PROTECTION DEVICES

A. SPD shall comply with ANSI/UL 1449 4th Edition or later listing by Underwriters Laboratories (UL).

B. SPD shall be factory installed integral to the panelboard by the original equipment manufacturer and shall be a product of the same manufacturer as the panelboard and breakers.

C. The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable single-mode modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

D. Electrical Requirements:

1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.

2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.

3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any

environmental hazards. End of life mode to be open circuit. Unit with end of life short-circuit mode are not acceptable.

4. Unit shall operate without the need for an external overcurrent protection device (OCPD) and be listed by UL as such. Unit must not require external OCPD or replaceable internal OCPD for the UL Listing.

5. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

	Protection Modes			
Configuration	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

6. Nominal Discharge Current (In) – All SPDs applied to the distribution system shall have a 20kA In rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an In less than 20kA shall be rejected.

7. ANSI/UL 1449 4th Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 4th Edition VPR for the device shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

2.10 ENCLOSURE

A. Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

B. Enclosures shall be provided with blank ends.

C. Where indicated on the drawings, branch circuit panelboards shall be column width type.

2.11 NAMEPLATES

A. Provide an engraved nameplate for each panel section as per Specification Section 260553.

2.12 FINISH

A. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

B. Provide typed directory for each panelboard.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 262726 – WIRING DEVICES

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install, where indicated, wiring devices, complete with backboxes and wallplates as specified herein, and as shown on the contract drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 260500 – Basic Electrical Requirements
C. Section 260532 – Interior Raceways Fittings and Accessories
D. Section 260534 – Outlet, Junction and Pull Boxes

1.03 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Receptacles with integral USB charger.
3. Receptacles with integral Arc Fault Circuit Interrupter, AFCI.
4. Plugload Control Receptacles.
5. Twist-locking receptacles.
6. Receptacles with integral surge-suppression units.
7. Isolated-ground receptacles.
8. Hospital-grade receptacles.
9. Tamper-resistant receptacles.
10. Weather-resistant receptacles.
11. Snap switches and wall-box dimmers.
12. Wall-switch and exterior occupancy sensors.
13. Communications outlets.
14. Pendant cord-connector devices.
15. Cord and plug sets.
16. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.04 DEFINITIONS

A. AFCI: Arc fault circuit interrupter.
B. EMI: Electromagnetic interference.
C. GFCI: Ground-fault circuit interrupter.
D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
E. Plugload Control Receptacle: Automatically occupancy switched receptacle.
F. RFI: Radio-frequency interference.
G. TVSS: Transient voltage surge suppressor.
H. UTP: Unshielded twisted pair.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.06 ACTION SUBMITTALS

A. Product Data: Manufacturer's standard catalog cut, highlighted for each type of product used.

B. Samples: One for each type of device and wall plate specified, in each color specified when so indicated on the drawings or requested by the Architect/Engineer.

1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. None unless otherwise specified on the drawings.

1.09 QUALITY ASSURANCE

A. Electrical components, conductors, devices and accessories described herein shall be listed and labeled as defined by NFPA 70 by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories (UL), for the intended use and shall bear its label.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Hubbell Incorporated; Wiring Device-Kellems; Wiring Device-Kellems (Hubbell) or a comparable product by one of the following:

1. Arrowhart Wiring Devices, Inc.; Division of Eaton.
2. Leviton Manufacturing Co., Inc.
3. Pass & Seymour/Legrand (Pass & Seymour).
4. Approved equal.

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors shall NOT be used unless otherwise specifically indicated in the drawings.

2.03 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles:

1. Requirements: Heavy Duty 125 V, 20A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2. Subject to compliance with requirements, provide product by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems; HBL5361 (single), HBL5362 (duplex) (Design Basis)
   b. Arrow Hart Wiring Devices, Inc.; Division of Eaton; 5361 (single), AH 5362 (duplex).
   c. Leviton Manufacturing Co., Inc.; 5361 (single), 5362 (duplex).
   d. Pass & Seymour/Legrand (Pass & Seymour); 5361 (single), 5362 (duplex).
   e. Approved Equal.

B. USB Charging Convenience Receptacles:

1. Requirements: Tamper Resistant, 125 V, 20A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1310, and FS W-C-596. Compatible with USB 1.1/2.0/3/0 devices, including Apple products.

2. Subject to compliance with requirements, provide duplex receptacle with 2 USB charging Ports or a comparable product by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems; USB 20X2 (design basis)
   b. Arrow Hart Wiring Devices, Inc.; Division of Eaton, TR7756.
   c. Leviton Manufacturing Co., Inc. T5832
   d. Pass & Seymour/Legrand (Pass & Seymour) TR5362USB.
   e. Approved Equal

C. Arc Fault Convenience Receptacles:

1. Requirements: 125 V, 20A: tamper resistant. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2. Subject to compliance with requirements, provide product by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems; AFR20TR (design basis)
   b. Arrow Hart Wiring Devices, Inc.; Division of Eaton. TRAFCI20
   c. Leviton Manufacturing Co., Inc. AGTR2
   d. Pass & Seymour/Legrand (Pass & Seymour), AFR202
   e. Approved Equal

D. Arc Fault / Ground Fault Dual Function Convenience Receptacles:

1. Requirements: 125 V, 20A, tamper resistant, Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 943, UL 498, and FS W-C-596.

2. Subject to compliance with requirements, provide product by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems; AFGF20TR (design basis)
   b. Arrow Hart Wiring Devices, Inc.; Division of Eaton. TRAFCI20
   c. Leviton Manufacturing Co., Inc. AFTR2
   d. Pass & Seymour/Legrand (Pass & Seymour), AFGFR202TR
   e. Approved Equal

E. Plugload Controlled Convenience Receptacles:

1. Requirements: 125 V, 20A, permanent controlled face marking: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2. Subject to compliance with requirements, provide product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; one controlled face BR20C1, or two controlled faces, BR20C2 (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Eaton, 5362CH (one face), 5362CD (2-faces)
c. Leviton Manufacturing Co., Inc. 5362-S1(one face) or 5362-S2 (two faces)
d. Pass & Seymour/Legrand (Pass & Seymour).5362CH (1-face) or 5362CD (2-faces)
e. Approved Equal.

F. Isolated-Ground, Duplex Convenience Receptacles:

1. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2. Requirements: 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

3. Subject to compliance with requirements, provide or a comparable product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; IG5362 (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Eaton; IG 5362.
c. Leviton Manufacturing Co., Inc.; 5362IG.
d. Pass & Seymour/Legrand (Pass & Seymour); IG5362.
e. Approved Equal.

G. Tamper-Resistant Convenience Receptacles:

1. Requirements: 125 V, 20 A: Comply with NEMA WD1, NEMA WD6 Configuration 5-20R, UL 498 Supplements, and FSW-C-596.

2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

a. Hubbell Wiring Device - Kellems; HBL5362TR (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Eaton; TRBR20.
c. Leviton Manufacturing Co., Inc.; TBR20.
d. Pass & Seymour/Legrand (Pass & Seymour); TR63.
e. Approved equal.

2.04 GFCI RECEPTACLES

A. Description:

1. Straight blade, non-feed-through type unless otherwise specified in the drawings.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.

3. Self-test function, line / load reversal protection.

4. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

5. Extra heavy duty, weather and tamper resistant.

6. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

7. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; GFR5632TR (design basis).
    b. Cooper Wiring Devices, Inc.; Division of Eaton; VGF20.
    c. Leviton Manufacturing Co., Inc.; 7899.
    d. Pass & Seymour/Legrand (Pass & Seymour); 2099.
    e. Approved Equal

2.05 RETRACTABLE CORD REELS

A. General Requirements:

1. Comply with NEMA WD 1, UL 20, and FS W-S-896.
2. Switches, 120/277 V, 20 A, 1HP @ 120V, 2HP @ 240V:

B. Description:

1. Steel construction including mounting base, 20A, 125VAC, NEMA 2 positive latching mechanism, minimum 5’ long input power cord and plug, adjustable guide arm, 25’L minimum 12/3 power cord.

2. UL 355 listed / certified.

3. Provide with double duplex GFCI straight blade receptacles on the payout end. Exception – Integral GFCI protection not required where upstream GFCI protection is provided by a GFCI branch circuit breaker or other device.

4. Unless otherwise noted in the drawings provide safety yellow color when used in shop classrooms, white when used in Science lab or Family/Consumer Science classrooms.

5. Provide with swivel base.

6. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; HBL45123 Series (design basis)
    b. KH Industries RTB3L Series.
    c. Approved equal.

2.06 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.

3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.07 TOGGLE SWITCHES

A. General Requirements:

1. Comply with NEMA WD 1, UL 20, and FS W-S-896.
2. Switches, 120/277 V, 20 A, 1HP @ 120V, 2HP @ 240V:

B. Single Pole:

1. Subject to compliance with requirements, provide product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; 1221 (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Eaton, Inc.; AH 1221.
c. Leviton Manufacturing Co., Inc.; 1221-2.
d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC1.
e. Approved equal.

C. Double Pole:

1. Subject to compliance with requirements, provide or a comparable product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; 1222 (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Eaton, Inc.; AH1222.
c. Leviton Manufacturing Co., Inc.; 1222-2.
d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC2.
e. Approved equal.

D. Three Way:

1. Subject to compliance with requirements, provide or a comparable product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; 1223 (design basis)
b. Arrow Hart Devices, Inc.; Division of Eaton.; AH1223.
c. Leviton Manufacturing Co., Inc.; 1223-2.
d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC3.
e. Approved equal.

E. Four Way:

1. Subject to compliance with requirements, provide product by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; 1224 (design basis)
b. Arrow Hart Wiring Devices, Inc.; Division of Easton.; AH1224.
c. Leviton Manufacturing Co., Inc.; 1224-2.
d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC4.
e. Approved equal.

F. Pilot-Light Switches:

1. Description: Single pole, with neon-lighted handle, illuminated when switch is "off.

2. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; 1221-PL for 120 and 277 V
    b. Arrow Hart Wiring Devices, Inc.; Division of Eaton.; AH1221-PL (120 ad 277 V).
    c. Leviton Manufacturing Co., Inc.; 1221-PLR (120V) or 1221-7PLR (277V).
    d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC1RPL (120V) or PS20AC1RPL7 (277V).
    e. Approved equal.

G. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; HBL1557 (design basis)
    b. Arrow Hart Devices, Inc.; Division of Eaton.; 1995.
    c. Leviton Manufacturing Co., Inc.; 1257.
    d. Pass & Seymour/Legrand (Pass & Seymour); 1251.
    e. Approved equal.

2.08 KEY-OPERATED SWITCHES, 120/277 V, 20 A

A. General Requirements:

1. Comply with NEMA WD 1, UL 20, and FS W-S-896.

2. Switches, 120/277 V, 20 A, 1HP @ 120V, 2HP @ 240V.

3. Single Pole, with factory-supplied key in lieu of switch handle.

B. Single Pole:

1. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; 1221L (design basis)
    b. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc.; AH1221L.
    c. Leviton Manufacturing Co., Inc.; 1221-2L.
    d. Pass & Seymour/Legrand (Pass & Seymour); PS20AC1-L.
    e. Approved equal.

C. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

1. Subject to compliance with requirements, provide product by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems; HBL1557L (design basis)
    b. Arrow Hart Wiring Devices, Inc.; Division of Eaton.; 1995L.
    c. Leviton Manufacturing Co., Inc.; 1257L.
    d. Pass & Seymour/Legrand (Pass & Seymour); 1251L.
    e. Approved equal.

2.09 WALL-BOX DIMMERS

A. Shall be compatible with lighting type used. Coordinate with drawings and lighting specification divisions.

2.10 WALL PLATES

A. Single and combination types shall match corresponding wiring device style. Multi-gang installations shall be installed under a single piece wall plate.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: Type 302 stainless steel, 0.04-inch thick, brushed brass with factory polymer finish.

3. Material for Unfinished Spaces: Galvanized steel.

4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, listed and labeled for use in wet and damp locations.

5. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.11 FLOOR SERVICE FITTINGS

A. Floor Service assemblies specified herein shall be for power use only. For assemblies containing data communications or combination power and data communications refer to technology drawings and specification sections for applicable products.

B. Type: Modular, flush-type, flap-type, above-floor, single-service units suitable for wiring method used as indicated in the drawings.

C. Compartments: Barrier separates power from voice and data communication cabling.

D. Service Plate: Rectangular or Round as indicated, finish die-cast aluminum finish with satin finish, unless otherwise indicated.

E. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

2.12 POKE-THROUGH ASSEMBLIES

A. Poke–Through assemblies specified herein shall be for power use only. For assemblies containing data communications or combination power and data communications refer to technology drawings and specification sections for applicable products.

B. Where not otherwise indicated on the drawings, subject to compliance with requirements, provide Hubbell Incorporated; Wiring Device-Kellems; products named below or a comparable product by one of the following:

1. FSR.
2. Wiremold / Legrand.
3. Approved equal.

C. Activation Type:

1. Recessed Activation.

a. Hubbell System One - Recessed Activation or approved equal.

1) S1R4PT: 4-inch core with two 1/2 inch and one 3/4 inch feed conduits.
2) Outlets: S1R4PTQUAD: Power only, with four power outlets.

b. Provide with appropriate subplate for device mounting and cover, finish chosen by Architect.

1) Cover Flange: 0.12 inch thick, ADA compliant.
2) Finish: As specified by Architect.

D. Surface Activation.

1. Hubbell System One - Surface Activation or approved equal:

a. S1PT4X4FIT with two 3/4 inch conduits for low voltage, one 3/4 inch for power.

2. Provide with appropriate subplate for device mounting and cover, finish chosen by Architect.

3. Cover Flange: ADA compliant appropriate for use in the floor finish installed.

4. Furniture Feed Cover: S1PFFT for tile applications or S1PFF for carpet applications as appropriate with one 3/4 inch connection for power and one 1-1/2 inch connection for low voltage.

a. Finish: As specified by Architect.

E. Pedestal Activation.

1. PT7XC, 2-inch poke through insert with a RX80 series pedestal, size as required or approved equal.

F. Description:

1. Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

2. Comply with UL 514 scrub water exclusion requirements.

3. Service-Outlet Assembly: As indicated on the plans."

4. Size: Selected to fit cored holes in floor and matched to floor thickness.

5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

6. Closure Plug: Arranged to close unused cored openings and reestablish fire rating of floor.

7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors

2.13 PREFABRICATED MULTIOUTLET ASSEMBLIES

A. Unless otherwise noted in the drawings, Subject to compliance with requirements, provide 20A, 120V by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems; Plug TrakHBL24 series steel.
b. Wiremold / Legrand.
c. Approved equal.

B. Two-piece surface painted steel brushed aluminum or PVC raceway, with factory-wired multi-outlet harness.

C. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

D. Raceway Material: Painted Metal for general use. PVC where subject to corrosive conditions.

E. Multi-outlet Harness:

1. Receptacles: 20 A, 125-V, NEMA WD 6 Configuration 5-20R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.

2. Receptacle Spacing: 12 inches, unless otherwise indicated.

3. Wiring: No. 12 AWG solid, Type THHN copper, single circuit.

2.14 SERVICE POLES

A. Subject to compliance with requirements, provide service poles or comparable product by one of the following:

1. Hubbell Wiring Device Kellems; HBL PP series (design basis)._
2. MonoSystems.
3. Legrand / Wiremold.
4. Approved equal.

B. Description:

1. Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.

2. Poles: Nominal 2.5-inch- square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.

3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.

4. Material and Finish: Painted steel.

5. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, four-pair, Category 3 or Category 5 voice and data communication cables.

6. Power Receptacles: Two duplex, 20-A, straight-blade receptacles complying with requirements in this Section.

7. Voice and Data Communication Outlets: complying with requirements in Division 27.

2.15 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Brown unless otherwise indicated or required by NFPA 70 or device listing. Exceptions – a) In offices, Libraries, Cafeterias, etc., color as specified by Architect, b) In partially renovated rooms - match existing devices to remain.

2. Wiring Devices Connected to Emergency / Standby Power System: Red.

3. TVSS Devices: Blue.

4. Isolated-Ground Receptacles: White, with orange triangle on face.

5. Controlled Receptacles – Green (where available) or where not available, other color differing from general use receptacles in the area.

B. Wall Plate Color: See “Wallplates” above. For plastic covers, match device color.

PART 3 – EXECUTION

3.01 INSTALLATION

A. See plans for device mounting heights. Otherwise, comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.

4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

4. Existing Conductors:

a. Cut back and pigtail or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Install devices flush and level.

2. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.

3. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

4. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

5. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.

6. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
7. Use a torque screwdriver when a torque is recommended or required by manufacturer.

8. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.

9. Tighten unused terminal screws on the device.

10. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

11. Receptacles shall have a bonding conductor from the grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not acceptable.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to left.

F. Wall Switches:

1. Install wall switches with OFF position down.

G. Device Plates:

1. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

2. Install device plates flush and level.

H. Dimmers:

1. Install dimmers within terms of their listing.

2. Verify that dimmers used for fan speed control are listed for that application.

3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

4. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multi-gang wall plates.

5. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

A. Comply with Section 260553 – Identification for Electrical Systems.

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.04 FIELD QUALITY CONTROL

A. Tests for Wiring Devices:

1. Inspect each wiring device for defects.

2. Verify each receptacle device is energized. Acceptable line voltage range is 105 to 132 V.

3. Test each receptacle for proper polarity. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.

4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

5. Using the test plug, verify that the device and its outlet box are securely mounted.

6. Operate each wall switch and wall dimmer with circuit energized and verify proper operation.

7. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 262816 – HEAVY DUTY SAFETY SWITCHES

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low-voltage fused and non-fused switches as specified herein and as shown on the contract drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 260500 – Common Work Results for Electrical
C. Section 260553 – Identification for Electrical Systems

1.03 REFERENCES

A. The switches and all components shall be designed, manufactured, and tested in accordance with the latest applicable standards:

1. NEMA KS-1
2. UL 98

1.04 SUBMITTALS – FOR REVIEW / APPROVAL

A. The following information shall be submitted to the Engineer:

1. Dimensioned outline drawing
2. Conduit entry/exit locations
3. Switch ratings including:

    a. Short-circuit rating
    b. Voltage
    c. Continuous current

4. Fuse ratings and type
5. Cable terminal sizes
6. Product data sheets

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process.

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.07 REGULATORY REQUIREMENTS

A. The safety switches shall bear a UL label.

1.08 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.09 QUALITY ASSURANCE

A. Electrical components, conductors, devices and accessories described herein shall be listed and labeled as defined by NFPA 70 by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories (UL), for the intended use and shall bear its label.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Subject to the requirements listed herein, provide product by one of the following:

1. Eaton
2. Siemens
3. General Electric
4. Square D
5. Approved Equal

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.02 HEAVY-DUTY SAFETY SWITCHES

A. Provide switches as shown on drawings, with the following ratings:

1. 30 to 1200 amperes
2. 240 volts ac; 600 volts ac
3. 2 and 3 poles
4. Fusible and non-fusible
5. Mechanical lugs suitable for aluminum or copper conductors.

B. Construction

1. Switch blades and jaws shall be visible and plated copper.
2. Switches shall have a red handle that is easily pad-lockable with three 3/8-inch shank locks in the OFF position.
3. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position (except for double-throw switches). Defeater mechanism shall be front accessible.

4. Switches shall have deionizing arc chutes.
5. Switch assembly and operating handle shall be an integral part of the enclosure base.
6. Switches rated 30 A to 600 A shall have reinforced fuse clips.
7. Switch blades shall be readily visible in the “ON” and “OFF” position.
8. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type. Bail type mechanisms are not acceptable.
9. Fusible switches shall be suitable for service entrance equipment (except for 4-pole switches and 1200 A when used on 480Y/277 or 600Y/347 grounded WYE systems)
10. Switches shall have line terminal shields (except for non-fusible double throw switches)
11. Switches shall be suitable for systems capable of 200 kA at 480 V with Class J, L, R, or T fusing as applicable for single-throw switches; Embossed or engraved ON-OFF indication shall be provided.
12. Double-make, double-break switch blade feature shall be provided.
13. Fuse pullers shall be provided on all NEMA 4X and 12 switches through 200 A
14. Renewal parts data shall be shown on the inside of the door.

C. Enclosures

1. All enclosures shall be NEMA 1 general purpose, for indoor use, unless otherwise noted.
2. Enclosures shall be NEMA 3R, rainproof, for outdoor or wet location use, unless otherwise noted,

    a. Enclosures shall NEMA 4X watertight corrosion-resistant; either 304 or 316 stainless steels, or fiberglass where and as indicated in the drawings.
    b. 30 A to 100 A NEMA 4X, and 12/3R enclosures shall be provided with draw-pull latches.

D. The following factory modifications are to be included:

1. Phenolic nameplates
2. Fungus proofing
3. Lock ON provisions
4. Factory installed neutral assemblies.
5. Class R fuse clips factory installed (30A - 600A)
6. Factory installed ground lug kits.

E. Provide fused switches with:

1. (1) complete set of fuses installed.
2. (1) complete set of fuses as spares.
3. (1) Fuse puller

2.03 SOLAR DISCONNECT SWITCHES

A. Provide 30- to 600-ampere switches as shown on the drawings for solar installations with the following ratings and characteristics:

1. Switches shall be UL listed for 600 VDC and shall be wired according to the listing instructions. Switches shall be wired with one circuit per switch. Multiple circuits shall not be permitted to be switched with a single mechanism.

2. NEMA enclosure shall be NEMA 3R, 12 or 4X as shown on the drawings.

3. Switches shall be listed as “Suitable for NEC Article 690 Applications” and shall be labeled with the maximum solar string as per NEC calculations.

4. Switches that can be energized from both the line and load side shall be marked:

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE
AND LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

5. Switches shall be supplied with a clear, factory-installed dead-front shield to guard against accidental contact with line or load terminals.

6. Switches shall have a factory-installed neutral block for terminating grounded conductors, and switches shall have a separate lug for equipment grounding conductors.

7. Fusible switches shall be equipped with Class R fuse clips as standard.

8. Fusible switches shall be supplied with one set of fuse clips only, and fuse holders must be isolated from any potential source when the handle is in the “off” position.

2.04 NAMEPLATES

A. Nameplate shall be front cover mounted, containing a permanent record of switch type, ampere rating, and maximum voltage rating.

B. Provide identification plate as indicated in Section 260553 – Identification for Electrical Systems.

PART 3 – EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.02 INSTALLATION

A. The equipment shall be installed per the manufacturer’s recommendations and all NEC and local code requirements.

B. Install fuses such that fuse rating information can be read without removing fuse.

3.03 TOUCH-UP PAINTING

A. Provide touch-up painting to restore and refinish to match original condition surfaces of electrical equipment scratched, marred during shipping, handling or installation. Remove any rust and prime and paint as recommended by manufacturer.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 265100 – INTERIOR LIGHTING

PART 1 – GENERAL

1.01 SCOPE

A. This section includes furnishing, installing and connecting interior lighting systems.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, the Related Sections listed below, apply to this Section.

B. Related Sections:

1. Section 260500 – Common Work Results for Electrical
2. Section 260519 – Low-Voltage Electrical Power Conductors & Cables
3. Section 260526 – Grounding and Bonding

1.03 DEFINITIONS

A. Lighting Fixture: An electrical device that contains one or more lighting elements which provide illumination. The terms “lighting fixture”, “fixture” “luminaire” carry the same meaning.

B. Night Lights: Light fixtures that are wired to the unswitched leg of the circuit. Night lights are not to be confused with emergency lights, which have a second source of power and may be switched.

1.04 SUBMITTALS

A. Product Data: Arrange in order of luminaire designation. The submittals shall include data on features, ratings, listings, certifications, accessories, finishes, dimensions, emergency components, photometric data, and luminaire efficiency data.

B. Manufacturer standard cut sheets fully highlighted or red-lined with selected features and options.

C. Closeout Submittal: Installation, Operation, and Maintenance Manuals.

D. Substitutions and/or equivalents: Where substitute or equivalent fixtures are proposed for use by the Contractor, and upon request of the Engineer or Architect, provide complete site-specific point by point photometric analysis of the proposed fixtures. The analysis shall be provided at no additional cost. Floor plan backgrounds will be provided by the Engineer /Architect upon request. Results shall include for each space:

1. Average illumination levels (in footcandles.)
2. Max/min ratios
3. Power density (Watts/sq.ft.)
4. Legend and schedule of proposed fixtures which includes lumen output per fixture, watts per fixture.
5. Fixture mounting heights (ft.).
6. Any de-rating factors applied.
7. Point by point plot of illumination levels at not more than 2’ x 2’ spacing.

1.05 QUALITY ASSURANCE

A. Lighting fixtures shall be of specification grade and listed or labeled by Underwriters Laboratories (UL) or an approved Nationally Recognized Testing Laboratory (NRTL).

B. LED fixtures shall comply with the following:

1. UL Standard 8750 “Light Emitting Diode Equipment for Use in Lighting Products”, IES Standard LM-79 “Electrical and Photometric Measurements of Solid-State Lighting Products”, IES Standard LM-80 “Measuring Lumen Maintenance of LED Light Sources”, and IES Standard TM-21 “Projecting Long Term Lumen Maintenance of LED Light Sources”.

2. ANSI C78.377 “Specifications for the Chromaticity of Solid State Lighting Products” with LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency amongst luminaries of the same type.

1.06 WARRANTY

A. For non-LED lighting fixtures and components, provide a complete warranty for parts and labor for a minimum of one year from the date of Substantial Completion.

B. For LED fixtures, lamps, drivers, and components, provide a complete warranty for parts and labor for a minimum of five years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES

A. Provide lighting fixtures in accordance with the Fixture Schedule.

1. Provide only LED fixtures with a Design Lights Consortium (DLC) listing, a U.S. Department of Energy (DOE) “LED Lighting Facts” label, or a U.S. Environmental Protection Agency (EPA) ENERGY STAR label, which have demonstrated third-party testing verification.

B. Unless otherwise specified, LED fixtures shall have a color temperature of 3500 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum.

C. Recessed lighting fixtures shall be thermally protected.

D. LED fixtures shall be modular and allow for separate replacement of LED light elements and drivers. User serviceable LED light elements and drivers shall be replaceable from the room side.

E. Dimmable LED fixtures shall have either a 0-10 volt, 3-wire dimming driver, or a two-step (50%-100%) line voltage, two switch controlled dimming driver, as shown on the drawings.

2.02 LAMPS

A. Unless otherwise specified, LED lamps shall have a color temperature of 3500 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum.

B. Retrofit LED lamps shall comply with NEMA SSL 4 “SSL Retrofit Lamps: Suggested Minimum Performance Requirements”.

2.03 BALLASTS AND DRIVERS

A. LED drivers shall be electronic type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 “Electronic Drivers for LED Devices, Arrays, or Systems”. LED drivers shall have a sound rating of “A”, have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.

B. Dimmable LED drivers shall be 0-10V type, unless otherwise noted. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.

C. Ballasts and drivers shall be rated for the ambient temperatures in which they are located. Outdoor fixtures shall be equipped with ballasts or drivers rated for reliable starting to -20 degrees F. Indoor fixtures located in areas with direct sunlight or above normal ambient temperatures shall have ballasts or drivers rated at 65 degrees C minimum.

D. Individually fused ballasts and drivers shall have their fuses accessible from outside of the fixture chassis.

2.04 EMERGENCY LIGHTING

A. Emergency lighting shall consist of normal lighting fixtures with generator or battery-inverter system backup, emergency lighting fixtures with individual battery backup, or sealed beam emergency lighting units in accordance with the Fixture Schedule.

B. Emergency lighting fixtures shall be capable of providing the listed emergency illumination for not less than 90-minutes after loss of normal power.

1. Battery-backed LED emergency lighting fixtures shall consist of a normal LED fixture with some or all the LEDs connected to a UL 924 Listed battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of fixture operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The fixture shall include a test/monitor module with LED status indicating lights mounted to be visible to the public. The fixture shall not contain an audible alarm.

2. Sealed beam emergency lighting units shall be UL 924 Listed, dual voltage 120/277V input, and shall consist of sealed beam LED lamps connected to an internally mounted battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of battery operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The unit shall be suitable for wall or ceiling mounting as required. It shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The unit shall include a test/monitor module with LED status indicating lights mounted to be visible to the public. The unit shall not contain an audible alarm.

2.05 EXIT SIGNS

A. Exit signs shall be of the LED type. Fluorescent, electro luminescent light panel, or self-powered luminous signs shall not be used. Subject to requirements, provide product from Chloride, Dual-Lite, Emergi-Lite, Exide Lightguard, Lightalarms, Lithonia, LSI Industries, Morelite, Prescolite, or Sure-Lites or approved equal.

1. Dual Voltage Input 120/277V, 60Hz., UL 924 Listed, UL Damp Location Listed.

2. LED’s shall be wired in parallel to prevent multi-lamp failure and shall be concealed within the sign by a clear panel and red optical diffuser. Power consumption shall not exceed 2 watts per face.

3. Exit signs shall have white die-cast aluminum or polycarbonate housings with universal mounting brackets; brushed aluminum stencil faces with red or green letters and multi-directional knockout arrows.

4. Exit signs shall be provided with extra faceplate for field conversion from single to double face.

5. Exit signs shall be provided with UL 924 Listed, 90-minute emergency battery packs and battery chargers when required. Batteries shall be maintenance-free nickel-cadmium and shall be mounted within the signs.

6. Shall include integral test switch and power indicator light.

7. New exit signs in installed existing buildings shall match the existing exit sign color scheme (red or green)

2.06 COMBINATION EMERGENCY / EXIT SIGNS

A. Combination emergency / exit signs shall be subject to the requirements outlined for sealed beam emergency lights and exit lights as described above. Subject to requirements, provide product from Chloride, Dual-Lite, Emergi-Lite, Exide Lightguard, Lightalarms, Lithonia, LSI Industries, Morelite, Prescolite, or Sure-Lites or approved equal.

2.07 LOW VOLTAGE LIGHTING CONTROL WIRING

A. 0-10VDC Dimming Control Wiring:

1. UL TYPE CMP/CL3P/FPLP plenum rated cable, 300V, 75CC
2. 16AWG or 18AWG stranded copper conductors,
3. White outer jacket, (2) conductors - violet and pink
4. Southwire Spec #70194 or equal

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Comply with NFPA 72, NECA 1 and manufacturer’s installation instructions.

B. Support recessed troffers independently of the ceiling grid system by using two safety wires minimum on diagonally opposite corners of the fixtures. Support recessed downlights by using safety wires or by rigidly attaching the fixtures to the building structure or ceiling grid system. Removable T-bar clips shall not solely be used to attach fixtures to the ceiling grid system.

C. Install fixtures level, with no gaps between adjacent fixtures or between fixtures and surrounding surfaces. Lenses, reflectors, and trims of fixtures shall be properly and uniformly aligned.

D. Where fixtures are shown with dual switches, control all inner lamps with one switch and all outer lamps with the other switch. Where dimming or occupancy sensor-controlled fixtures are shown, control the fixtures in accordance with the appropriate wiring diagram or manufacturer's instructions.

E. Connect night light fixtures and emergency lighting fixtures to the hot (unswitched) side of the area lighting circuits.

F. Provide an individual feed with ground conductor from a junction box to each lighting fixture. Lighting fixtures shall not be daisy chained.

G. Drops to recessed fixtures may be flexible metallic conduit, or manufactured wiring systems may be used where accessible. Fixtures shall be provided with sufficient length to permit removal and lowering of the fixtures 12” below the ceiling.

H. Provide green grounding conductors back to the panel ground for lighting circuits. Raceways shall not be used as grounding conductors.

I. Fixtures shall have their exterior labels removed and shall be thoroughly cleaned. Burned out lamps or arrays shall be replaced. Cracked or damaged lenses shall be replaced.

J. Locate emergency lighting remote battery packs and remote test/monitor modules identically so their status indicating lights are visible to the public and they form a straight line when viewed from the end of the corridor or room. Where a suspended ceiling exists, center the status indicating lights in adjacent ceiling tiles.

K. Mount sealed beam emergency lighting units where shown and aim their lamps to light the egress path as uniformly as possible.

L. When emergency lighting fixtures contain audible alarms, disable the alarms in accordance with manufacturer's instructions.

M. Sealed beam emergency lighting unit fixtures and the emergency supply of emergency battery/inverter fixtures shall be wired to the area lighting circuit ahead of any switching controls. Exception, when three or more normal lighting circuits supply a separate and uninterrupted area, that may be supplied from a separate dedicated circuit from the same panel and provided with a lock-on circuit breaker.

N. Clean all fixtures of construction dust and fingermarks prior to final inspection.

3.02 FIELD QUALITY CONTROL

A. A visual inspection shall be performed to verify cleanliness and alignment of the fixtures. Misalignment and light leaks shall be corrected and rattles due to ventilation system vibration shall be eliminated. Damaged or broken lenses shall be replaced.

B. Perform an operational test to verify that all fixtures illuminate properly, dimming systems dim properly (i.e. no flicker), and lighting zones are switched according to the drawings.

C. Test all emergency and exit lighting by interrupting the normal lighting supply to verify proper operation. Verify proper re-transfer to normal operation upon restoration of normal power.

END OF SECTION

DIVISION 27 – COMMUNICATIONS

SECTION 271501 – COMMUNICATIONS AND HORIZONTAL CABLING

PART 1 – GENERAL

1.01 GENERAL NOTES

A. The intent of the specification section is to outline the scope of work products and execution relating to furnishing and installing Network Cabling at the new or remodeled buildings and/or building additions. This includes but is not limited to Backbone and Horizontal cabling comprised of Copper and Fiber Cabling, and support systems are covered under this document and the Electrical Contractor shall complete as part of their bid and subsequent required design, implementation, service and installation.

B. All work associated with Division 27 and its intent shall be coordinated with all other work as furnished and installed by other trades that may or may not interface, interact or be dependent upon the work herein.

C. The Electrical contractor shall meet all required deadlines for installation and implementation and shall notify the Architect/Engineer of any difficulty that he or she faces that may alter these deadlines.

D. The Electrical Contractor shall also notify the Architect/Engineer or the Owner’s designated representative of any design discrepancy, site limitation, or configuration, which would prohibit the contractor from a successful and timely installation. Failure to notify these parties shall result in the contractor's sole responsibility for it.

E. The Electrical Contractor shall be solely responsible for ascertaining, determining and subsequently paying the appropriate prevailing wage rates for the work herein. The Architect/Engineer and the Owner will be held harmless from these and any decisions that the contractor reaches that pertain to the contractor's work.

F. The Electrical Contractor shall be responsible for the copper and fiber data cable, cable management and terminations of such as shown on all E/T series drawings.

G. The Electrical Contractor shall be responsible for the data power and surface raceway as shown on all E/T series drawings.

H. All technology power and data wiring shall be performed by the Electrical Contractor. All references made to the Division 27 Contractor shall mean the electrical contractor.

1.02 PROJECT DESCRIPTION

A. The Network Infrastructure Design is as follows:

1. Category 6/6A UTP and STP cabling to the Workstation Locations.

B. Category 6/6A Unshielded Twisted Pair Copper cabling shall be used to connect the workstations to the nearest Telecommunications Closet (TR), Category 6/6A Unshielded Twisted Pair Copper cabling shall be used for the horizontal structured cabling.

1.03 BIDDERS QUALIFICATIONS

A. All prospective Bidders must possess a minimum of five (5) years continuous experience as a firm doing business under the same name, engaged principally as a contractor for the work proposed.

B. All prospective Bidders must maintain an experienced technical and in house organization for the project, and must maintain an office facility with full-time employees in a commercial space.

C. All data wire installers shall be certified CAT 6/6A and Fiber installers, and the contractor shall provide copies of the certifications from manufactures of UTP/STP copper cabling systems and optical fiber cabling systems such as Hitachi Cable of America or equivalent.

D. All systems, equipment or products herein specified shall be provided and installed by an Authorized Factory Installer for this system, equipment or product.

E. All prospective Bidders shall be able to provide the Owner with the appropriate manufacturer's warranty and service on the proposed equipment. Structured cable manufacturer's warranty shall be a minimum of 20 years.

F. All prospective Bidders will maintain a staff of trained, certified technicians for equipment being specified for this project.

G. A minimum of five years' experience in the application of specified equipment is required.

H. A list of projects completed within the last year with contact names and telephone numbers is to be provided upon request.

I. All prospective Bidders shall use licensed electricians for any electrical work being performed within this contract.

1.04 CONTRACT SUPERVISION

A. In accordance with the requirements of the General Conditions, the Electrical Contractor will assign a competent full-time superintendent to the project, and that superintendent shall be maintained on the project for its duration.

1.05 GENERAL PROVISIONS

A. All Division 26 installations shall be performed by an electrical contractor who is certified in the product specified. A copy of certification documents must be submitted with the bid for such bid to be valid. The Electrical Contractor is responsible for workmanship and installation practices in accordance with the wiring program specified. At least 30 percent of the copper installation and termination crew must be certified by the manufacturer specified. In addition, at least 10 percent of the optical fiber installation and termination crew must have technician level of training and must be certified by the manufacturer specified or other approved organizations in Optical Fiber installation and termination practices.

B. All electrical installations shall be performed by a electrical contractor possessing a New York State Electrical license.

C. Any specifications that apply to the electrical contractor will be referred to Division 26 specification.

D. Where the word "Provide" is used, it shall be defined as requiring the furnishing and installing of all items indicated complete in all respects and ready for operation unless otherwise specifically noted.

E. The Electrical Contractor shall be responsible for furnishing all labor, superintendence, materials, tools, equipment, and sources necessary for the complete installation of all data work for this technology implementation project as shown on the plans and as herein specified.

F. The Clerk of the works or Construction Manager will be assigned to the project by the Owner and will be clearly defined to the contractor before any work commences.

G. It is the intent of this specification and the accompanying plans that the Electrical Contractor provides a data cabling system complete in every respect and ready to operate. All miscellaneous items and accessories required for such installation whether or not such items or accessories are shown on the plans or mentioned in these specifications shall be furnished and installed.

H. Where the words inactive components is used it refers to all network materials such as patch panels, jacks, patch cords, etc. that are passive to the network (Infrastructure).

I. The Electrical Contractor shall, in writing, accompanying his/her bid, report to the Architect/Engineer of any discrepancy or existing condition which would prohibit him/her from performing his/her work to its full extent - a complete and acceptable system.

J. No "Waiver of Responsibility" for inadequate, incomplete, or defective work will be considered or accepted by the Architect/Engineer unless written notice of a difficulty arising from any existing condition is made part of this Contractor's bid.

K. At each location that a new voice/data or audio/video cable is provided two (2) patch cords shall be provided. One (1) for the closet side and one (1) for the device side. Patch cord lengths and colors shall be coordinated and finalized with the Owner.

1.06 GENERAL SPECIFICATIONS

A. The following Drawings and accompanying specifications are for the sole purpose of providing the Owner with a complete and thorough infrastructure solution.

B. All inactive components such as the cabling, jacks, racks and such are part of this contract and are the responsibility of the Electrical Contractor to supply and install according to industry standards and accompanying specifications.

C. Workstations and any software running within the workstations are outside of this scope and thus not part of this contract.

D. It is the intent of this specification and accompanying drawings to show an overall network infrastructure design but not a complete detail of all components within the design. It is the responsibility of the Electrical Contractor to provide, install and configure all materials and components in order to have a complete and thorough data network infrastructure system.

E. The Electrical Contractor will provide the specified manufacturer solution for the CAT-6/6A copper cabling in order to provide the Owner with an extended warranty. Alternate manufacturer solutions will be accepted at the discretion of the owner/engineer.

F. The Electrical Contractor will provide the specified manufacturer solution for the fiber cabling in order to provide the Owner with an extended warranty. Alternate manufacturer solutions will be accepted at the discretion of the owner/engineer.

G. Wherever a discrepancy occurs in the specifications or the drawings or between the drawings and the specifications the contractor will accept the architect/engineer’s interpretation of such issue(s).

H. Neither the drawings nor the specifications shall take precedence over the other. Where conflict occurs between both, the one with the more stringent standards shall supersede the other.

1.07 MATERIALS

A. All materials, active or inactive, mentioned for this project are described by specific brand names. It is the intent of the architect/engineer to set a performance standard based on the specific brand name mentioned. The contractor may submit any other brand name just as long as the equipment or materials meet the performance standards as that of the specific brand that the architect/engineer has chosen.

B. It is the responsibility of the contractor to provide, install and configure all materials or equipment mentioned or not mentioned throughout this package in order to achieve a complete and thorough structured cabling system as described previously.

C. The cabling system described in this specification is derived from the recommendations made in recognized telecommunications industry standards.

The following documents are incorporated by reference:

1. ANSI/TIA 568.0-D, Generic Telecommunications Cabling for Customer Premises
2. ANSI/TIA 568.1-D, Commercial Building Telecommunications Cabling Standard
3. ANSI/TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard
4. ANSI/TIA-568C.3 Optical Fiber Cabling Components Standard
5. ANSI/TIA-568C.4 Coaxial cabling Components Standard
6. ANSI/TIA 606B, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
7. ANSI/TIA 607-C, Commercial Building Grounding/Bounding Re ANSI/TIA 942-A Telecommunications Infrastructure Standard For Data Centers
8. TIA-862-A, Building Automation Systems Cabling Standard
9. ANSI/TIA 569-D, Commercial Building Standard for Telecommunications Pathways and Spaces
10. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) – 13th Edition.
11. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC) -2017 Edition

D. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Electrical Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

E. This document does not replace any code, either partially or as a whole. The Electrical Contractor must be aware of local codes that may impact this project.

F. It is the responsibility of the Electrical Contractor to notify the architect in writing if there are any conflicts with the materials or products the architect/engineer has specified that will make a complete network system installation impossible or difficult.

1.08 ALTERNATES

A. Although the Owner does not restrict, by use of a brand name or model, it does have certain features, which it deems desirable. The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

B. Bidders wishing to submit alternate equipment shall submit to the Architect/Engineer the system proposed to provide an equivalent functional alternate to meet specifications. Bidders shall provide all pertinent information including manufacturer specification sheets, working drawings, shop drawings and a demonstration of the system.

C. In accordance with the requirements of the General Conditions, Contractors bidding equipment or systems other than those items specified shall submit those items as equivalents or substitutions to those specified on the Bid Proposal Form in the applicable location. Complete specifications and literature describing alternates MUST be attached to the Bid Form on each item bid. Contractors bidding on substituted or equivalent items may be required to provide a sample of same for evaluation.

D. No substitutions will be considered after the Contract award.

1.09 CODES

A. All work included within the specification package and in the drawings shall be governed by the following rules, guidelines, standards, and authorities. All documents listed are believed to be the most current:

NEC	National Electric Code 2017 Edition
OSHA	Occupational Safety & Health Administration
ANSI	American National Standards Institute
NFPA	National Fire Protection Association
ASA	American Standards Association
IEEE	Institute of Electrical & Electronics Engineers
NEMA	National Electronics Manufacturers Association
UL	Underwriters' Laboratory
ELT	Electrical Testing Laboratories Inc.
EIA	Electrical Industries Association
TIA	Telecommunications Industries Association
FCC	Federal Communications Commission
ISO	International Standards Organization
BICSI	Building Industry Consulting Service International

B. All equipment or material that is subjected to UL listings shall be properly labeled.

PART 2 – SCOPE OF WORK

2.01 INSTALLATION CHECKLIST

A. The Electrical Contractor shall have the following information in order to install a complete and accurate job:

- The Drawing Set
- The Design Documentation Project Manual.

2.02 WORK INCLUDED

A. All work required to install and configure a complete data network infrastructure system as described previously will be the Electrical Contractors' responsibility. The work included under this specification consists of furnishing all labor, equipment, materials/supplies and performing all

operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Electrical Contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.

B. The work shall include, but not be limited to the following:

1. Furnish and install a complete telecommunication wiring infrastructure as specified later in this specification package according to industry standards.
2. Furnish, install, and terminate all UTP cable.
3. Furnish and install all wall plates, jacks, patch panels and patch cords.
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Perform link or channel testing (100% of horizontal and/or backbone links/channels) and certification of all components.
7. Furnish test results of all cabling to the owner on disk and paper format, listed by each closet, then by workstation ID.
8. Adhere and comply with all requirements of specified programs.

C. The Electrical Contractor will provide and install all cabling at the teacher drop locations where applicable. This includes all video and audio jumpers and video and audio patch cables.

D. The Electrical Contractor will terminate all data cabling as specified later in this specification package according to industry standard in specified surface raceway provided and installed by the Division 26 electrical contractor.

E. The Electrical Contractor shall coordinate with the electrical contractor all data drop location setup components as mentioned in specification Section 271501 and drawings.

F. The Electrical Contractor will provide and install all specified materials at all specified wire closet locations.

G. The Electrical Contractor will be responsible for any damage done to any part of the buildings during the installation of the network wiring.

H. All building penetrations used for the network wiring infrastructure shall be the responsibility of the Electrical Contractor. This includes core drilling and access to any rooms.

I. The electrical contractor will be responsible for the removal and relocation of any smart boards, tack boards, tack strips, etc.

J. The electrical contractor will be responsible for any cutting and trimming that may be required to install specified surface raceway in all data drop locations. The contractor shall be responsible for all patching and painting to restore to original condition.

K. The Electrical Contractor will provide all testing results for the specified equipment and products.

L. The Electrical Contractor will follow all industry standards for the installation of all materials and equipment.

2.03 GUARANTEE/WARRANTY

A. The Electrical Contractor will be able to provide two separate extended warranties for the data cabling being installed, one for the CAT-6/6A copper cable installation and one for the Fiber Optic cable installation.

B. The extended warranty must be backed by the manufacturer and shall be no less than 20 years.

C. If the Electrical Contractor is submitting alternate materials or equipment, the substituted material or equipment shall provide the extended warranty that is required of the system.

D. Any failed network equipment or material shall be the responsibility of the Electrical Contractor and shall be replaced immediately.

E. Besides the extended manufacturer warranty, the Electrical Contractor will provide the Owner with a separate warranty notifying the Owner that all work performed by this contractor or any of his/her subcontractors or anyone the contractor employed for any installation of the network infrastructure for the Owner was done according to the specifications of the project and in accordance with all applicable industry standards. This warranty will guarantee all work against faulty and improper material and workmanship. This warranty shall be in conformance with the requirements of the Contractor's Guarantee within Specification Section 017000 and any other warranties for longer terms that apply to any of the components or materials shall apply.

F. The Electrical Contractor will provide the extended manufacturer's warranty and his/her own personal warranty no longer than 15 days after he/she has stated in writing and the architect or engineer have verified that the full network installation and configuration has been finished and completed.

2.04 WORK SCHEDULING

A. The Electrical Contractor must submit, in writing to the Owner, a schedule of the work that will be performed throughout the project by building. The work schedule shall be submitted for approval to the clerk of the works or construction manager no later than 7 days after the award has been issued.

B. The Electrical Contractor must adjust his/her work schedule and working hours according to the Owner's schedule. It is the responsibility of the contractor to coordinate his/her schedule with that of the Owner.

C. The Electrical Contractor's work will not be allowed to interfere with the Owners daily work schedule unless given direct permission from the clerk of the works or construction manager.

D. The Electrical Contractor will be responsible for cleaning up any debris caused during the installation after each work period (daily).

E. No data cables shall be left exposed at the end of each work period and any equipment specified for the network design shall not be left accessible to the public. The Electrical Contractor must secure all data wiring and network components at the end of the work period.

F. The clerk of the works or construction manager shall perform a visual inspection at the end of the workday in order to determine that the Electrical Contractor is following proper procedures for securing and cleaning the work area.

G. Any drilling that must be performed must first be cleared with the clerk of the works or construction manager or architect/engineer.

H. Any relocation or removal of any existing equipment such as tables, shelves, file cabinets etc., shall first be cleared with the clerk of the works or construction manager for approval.

I. The Electrical Contractor will replace any ceiling tiles removed during the workday as to not have any exposed wires during the next Owner workday.

J. No surface raceway shall be left exposed with data or electrical cables installed.

K. If the Electrical Contractor must integrate any existing LAN(S) into the new LAN, the contractor has to notify the Owner or the clerk of the works or construction manager of any interruption that might occur during the process. The clerk of the works or construction manager will ensure that all parties are notified, which may be affected by the down time on the existing network in order to achieve a full installation and integration to the new LAN.

L. The Electrical Contractor must notify the clerk of the works or construction manager and architect/engineer of any conditions that might cause a delay in the completion of the project.

M. The Electrical Contractor must coordinate with the clerk of the works or construction manager for a storage location(s).

N. The Owner will not provide a location where the contractor can store his/her equipment. The Electrical Contractor shall provide his/her own storage facilities.

O. The Electrical Contractor will have to coordinate his/her schedule with that of the electrical contractor since the electrical contractor will be providing and installing the surface raceway at the data drop locations.

2.05 SUBMITTALS

A. With the bid response the Electrical Contractor will submit a list of all the subcontractors that will be involved with the project.

B. With the bid response the Electrical Contractor will submit all cut sheets for all materials and equipment being proposed for installation. This list will be subject to review and approval by the architect.

C. All equipment or material in a material list shall first be approved before any shop drawings can be submitted by the contractor.

D. Before any data cables are pulled, the Electrical Contractor must submit a printed schedule of all data drop locations. The schedule shall indicate the data drop identification and termination location. The engineer or architect must review and approve the pull schedule prior to startup of any work.

E. Shop drawings shall be submitted with sufficient time for the engineer or architect to review drawings.

F. Shop drawings and cut sheets must be submitted for all equipment or material being used for project completion. The cut sheets shall be original catalog or PDF reproduced sheets clearly identifying the item submitted.

2.06 DRAWINGS

A. It shall be understood that the details and drawings provided with the specifications are diagrammatic. They are included to show the intent of the specifications and to aid the Electrical Contractor in bidding the job. This contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.

B. The Electrical Contractor shall verify all dimensions and distances at the site and be responsible for their accuracy.

C. Prior to submitting the bid, the Electrical Contractor shall call the attention of the engineer or architect any materials or apparatus the contractor believes to be inadequate and to any necessary items of work omitted.

PART 3 – MATERIAL SPECIFICATIONS

3.01 COPPER NETWORK CABLING

A. Horizontal cabling, cable to the workstation, shall be Category 6/6A Unshielded Twisted Pair, 4 pair, as manufactured by Hitachi Cable of America or equal.

B. Cable must be plenum rated with UL, CMP listing.

C. Cable must be 4 pair 23 AWG Solid UTP, FEP primary insulation and a low smoke PVC jacket.

D. The copper cable must be able to handle the following applications:

- Gigabit Ethernet/1000 Base-T
- Fast Ethernet/100 Base-T
- Ethernet/10 Base-T
- 155 Mbps ATM
- IEEE 802.3
- IEEE 802.3ab
- IEEE 802.5
- IEEE 802.12
- ISDN
- Voice
- 550MHZ Broadband Video

E. The Category 6 cable shall meet or exceed ANSI/TIA Category 6 requirements for NEXT, Characteristic Impedance, SRL, Attenuation and Delay Skew, PS-NEXT, ELFEXT and PS_ELFEXT.

F. All UTP drops must be certified at 20 degrees C with a length not to exceed 90 meters.

G. All UTP drops must perform within the following parameters at 250 MHz:

Electrical Parameters (@ 250MHz)	**TIA 568-C.2 verified min. std. (Additional performance margin guaranteed)**
Insertion Loss	32.8 dB
NEXT	38.3 dB (41.3 dB)
PSNEXT	36.3 dB (39.3 dB)
ACRN	5.5 dB
PSACRN	3.5 dB
ACRF	19.8 dB (22.8 dB)
PSACRF	16.8 dB (19.8 dB)
Return Loss	17.3 dB

1. Termination of the copper cable shall be at an 8-position snap-in modular jack following the T568B pin assignment. All audio/video over CAT 6 cable components shall be terminated

using the color code on the back of the modules. The maximum allowable amount of untwisting during cable termination shall be less the ½ inch.

2. As an option, Category 6A cabling shall be considered. This cabling shall meet all of the specifications listed above. In addition to the above, it must support 10G base T;

Electrical Parameters (@ 500 MHz)	**TIA 568-C.2 verified min. std. (Additional performance margin guaranteed)**
Insertion Loss	45.3 dB
NEXT	33.8 dB
PSNEXT	31.8 dB
ACRF	13.8 dB
PSACRF	10.8 dB
Return Loss	15.2 dB
PSANEXT	52.0 dB (58.0 dB)
PSAACRF	24.2 dB (30.2 dB)

3.02 MULTI-MODE FIBER OPTIC CABLE-

A. The backbone cable between the zone cabling box and the existing ER shall be Armored 12 strand 50/125 multimode cable OM3 or OM4 LOMM Fiber

B. All fiber optic strands shall be terminated at both ends with LC Connectors. These Optical Fiber cables shall be either Quick Crimp Connectors or Pig tails that are to be fusion spliced, as specified.

C. Certified installers for such equipment shall perform all terminations.

D. Minimum bend radius allowed of the cable shall not exceed 12 times the outside diameter of the cable which is approximately 2 inches.

E. Connectors shall have a maximum of 0.5dB loss per connection and be industry standard type designed for LOMM 50-micron fiber.

F. Provide fiber optic patch cords to connect all pairs from fiber patch panel to voice and data switches. Cables shall be LC to LC, 1, 2 and 3 meters for each closet.

3.03 MAIN WIRE CLOSET EQUIPMENT ROOM (ER)/REMOTE WIRE CLOSET TELECOMMUNICATIONS ROOM (TR) MATERIALS

A. These materials shall include but not limited to vertical cable management and support for the patch cords at the front of the rack and wire management, support, and protection for the horizontal cables inside the legs of the rack.

B. Ladder Rack and Waterfall cable management shall be provided at the top of the rack for all network cable and fiber entering the rack for protection and to maintain proper bend radius and cable support.

C. Wire management shall also be mounted above each patch panel and/or piece of equipment on the rack.

D. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack.

E. Racks shall have EIA hole pattern on front and rear.

F. Rack shall be black in color to match the patch panels and cable management.

3.04 DATA DROP LOCATION AND MATERIAL

A. Refer to Technology Series Drawings for a list of all materials at all data drop locations.

B. All data drop network cable shall be neatly dressed, secured and concealed throughout the installation.

C. The Electrical Contractor shall install the Data Drop network cables with a maximum of 1-meter service loop (slack cable) neatly coiled and secured in ceiling space above at the station location and a 2-meter service loop at the closet end.

PART 4 – DETAIL SPECIFICATION

4.01 CABLE ROUTING AND INSTALLATION

A. The following guidelines apply to all technology cabling being installed and routed through the hallways, classrooms or any other location where the specified cable will be installed.

B. It is the responsibility of the Electrical Contractor to determine the best possible path for any cable run as long as it follows the network design set forth by the architect/engineer.

C. Wherever possible the Electrical Contractor will route all his/her cable in the cavity created by the drop ceiling, crawl spaces or attic space. All cables shall be plenum rated.

D. Wherever the Electrical Contractor is unable to route cables as mentioned in item C, the contractor shall run cables in architect/engineer approved surface raceway or conduit at a maximum fill capacity of 40%. For any penetrations of conduit or raceway through fire rated partitions, please refer to Section 078413 – Penetration Firestopping, for fire stopping requirements.

E. All cabling shall be supported in cable support system such as “J” hooks or any other approved support system. Data cables shall be bundled with plenum rated hook and loop Velcro ties to a snug fit, which does not deform the cable geometry.

F. All network cables shall be secured a minimum of six (6) inches above the ceiling T-bar grid.

G. The Electrical Contractor should maintain TIA/EIA standards which deal with the proximity of communications cabling to high voltage cabling, motors, transformers, fluorescent lighting and ballast’s, etc. If these standards can’t be met the contractor shall notify the architect/engineer. In addition to the installation standards from BICSI,

H. The Electrical Contractor shall not rest, fasten, or support the data cables on; steam pipes, electrical conduit, insulated pipes or sprinkler pipes, ceiling grid supports, water pipes or HVAC ducting.

I. In areas without adequate support structures, the Electrical Contractor shall install “J” hooks or additional ceiling grid hangers on five (5) foot off center secured to a building structure.

J. Strip ties, saddles and J-hooks shall be plenum rated and must be installed as per industry standards.

K. The Electrical Contractor shall not install more than 15 individual data cables to a single hanger or “J” hook without the use of a two-inch wide saddle to eliminate strain on the individual cables.

L. The Electrical Contractor shall be responsible for replacing or patching any system that was damaged during network installation.

M. The Electrical Contractor will not support any data cables with power cables or fire alarm cables within the same support system.

N. The Electrical Contractor must avoid installing all cable in any location that may cause any obstruction to any existing building functions.

O. If Electrical Contractor chooses to run cables in attic space, he/she must lay cables in J-Hooks or cable trays.

4.02 WALL OR FLOOR PENETRATIONS

A. The Electrical Contractor must notify the clerk of the works or construction manager of any drilling that may be required to install data cables.

B. The Electrical Contractor is responsible for drilling that is not performed by the General Contractor in all locations needed to install specified data wiring.

C. The Electrical Contractor must provide and install all sleeves and conduits that may be necessary for a proper installation of their specified data wire.

D. If necessary, the Electrical Contractor must provide his/her own separate wall or floor penetrations for data wiring. The contractor may not use existing penetrations because existing penetrations may not be sleeved, and damage may be caused to existing wires at that location.

E. If conduit is being used the size of conduit must be determined by the number of cables that will be installed within conduit. Conduit fill shall not exceed 40 percent.

F. Conduit shall be installed with the appropriate bend radii to maintain the required bend radius for the Copper and Fiber Optic Cable. Install pull boxes every 100 feet and at every 90-degree turn.

G. It is the responsibility of the contractor to provide fire stopping at all penetrations made by him/her in all fire-rated and time rated walls, floors, ceilings, and partition assemblies in accordance with National Electric Code.

H. The Electrical Contractor shall provide the Owner with a fire stopping system, installed to resist the spread of fire and the passage of smoke and other gases.

I. The fire stopping material shall be approved and tested by U.L. or other qualified and approved inspection agency for the designated fire resistance rating.

J. The fire stopping material shall contain no detectable asbestos and comply with all local regulations.

4.03 TELECOMMUNICATIONS ROOM (TR) INSTALLATION

A. Refer to Technology Drawings for a list of materials at all wire closet locations.

B. Wall mounted termination shall be mounted on 4’ x 8’ x .75” void free, fire-resistant plywood. The plywood shall be mounted vertically 12” above the finished floor. The plywood shall be painted with two coats of white fire-retardant paint.

C. The network cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B standard and best industry practices.

D. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

E. Cables shall be neatly bundled and dressed to their respective panels. Each panel shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

F. All cables shall be routed through a cable support system, ladder rack and waterfall cable management shall be provided at the top of the rack for all network cable and fiber entering the rack for protection and to maintain proper bend radius and cable support.

G. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

H. Racks shall have EIA hole pattern on front and rear.

I. The Electrical Contractor must provide 20 percent spare ports in Category 6/6A and Fiber patch panels for future use.

J. Any cables leaving or entering the wire rack shall be neatly bundled and encased in approved cable management system.

4.04 DATA DROP LOCATION INSTALLATION

A. The Division 26 Electrical Contractor will provide and install all raceway, divider, power, receptacles, and faceplates within the Data Drop Location except for the Category 6 Modular Jacks (refer to E/T series drawings).

B. All materials that will be mentioned in this section have been identified and specified earlier in this specification package under Part III.

C. Refer to Technology Drawings for a complete list of materials at all data drop locations.

D. The Division 26 Electrical contractor will install dual surface raceway in specified locations. Electrical contractor will provide and install divider wall within surface raceway. Divider wall must run continuously throughout surface raceway.

E. All surface raceways shall be mechanically anchored with appropriate fasteners.

F. Electrical contractor must terminate metal jacket of power cable/conduit properly at entrance of surface raceway.

G. All data drops shall be spaced 3’ on center. The Electrical Contractor shall notify the clerk of the works or construction manager if this setup is not possible and then contractor shall space out data drops evenly about the length of surface raceway that can be installed.

H. The Electrical Contractor will install CAT-6/6A copper cable within surface raceway and terminate it in front loading Enhanced CAT-6 modular jacks following T568B standards. Modular jacks shall be installed in snap in faceplates which will be installed in specified molded covers.

I. The Division 26 Electrical contractor is responsible for all branch circuits, receptacles and hanging device brackets if specified (refer to E/T series drawings).

J. Electrical contractor will supply and install all accessories as required for a complete installation of surface raceway (refer to E/T series drawings).

K. Cable shall be labeled at each end.

L. All label printing will be machine generated using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

M. The Electrical Contractor shall coordinate with the architect/engineer any surface raceway configuration changes caused by any obstacles and or casework locations.

N. Cutting and notching of any ornamental trimming will be the Division 26 electrical contractor's responsibility. The electrical contractor must notify the clerk of the works or construction manager if any cutting for proper installation must take place.

O. Electrical contractor shall notify the clerk of the works or construction manager if installation of surface raceway is impossible at any specified location.

P. Electrical contractor shall notify the clerk of the works or construction manager if installing a different setup than that which has been specified.

PART 5 – PROJECT CLOSE-OUT

5.01 GENERAL PROVISIONS FOR TESTING

A. Before final application is considered for review the Electrical Contractor must submit all test results to the architect/engineer in order for them to be reviewed and accepted.

B. The clerk of the works or construction manager can be present during such testing and will be able to inspect contractor installation and workmanship.

C. Any work that does not comply with specifications mentioned throughout this specification package or industry standard shall be replaced and reinstalled at contractor's expense.

D. Certificate of compliance and all test results shall be provided to the Owner upon each item of testing.

E. Any failed copper cables or fiber optic cables shall be removed and re-installed. If a fiber strand fails out of the full fiber optic cable bundle, then the contractor will denote that fiber strand and remove it from any termination equipment. Data contractor will then replace that failed # of strands.

F. Electrical Contractor shall submit written test reports for all types of cables and on each individual cable. All individual test reports shall be bound into a booklet form. Electrical Contractor shall submit (1) paper copy of final testing report to Architect/Engineer and all data on CD. For multiple buildings provide (1) copy for each building involved in the project.

G. Prior to the start of work, Electrical Contractor shall submit test booklet format and blank test report forms for Engineer approval.

H. Report booklet shall include final riser diagrams with cable identification numbers.

I. Provide cover sheet per building including all nodes and associated test results. Cover sheet shall include Building Name, Wiring Closet Number, Type of Cable, Room Number, Room Name, Result (Pass or Fail), Length, etc.

5.02 CATEGORY 6/6A COPPER CABLE TESTING

A. Category 6 copper cable shall meet all manufacturing standards and all ANSI/TIA 568C.2 standards for attenuation, Propagation Delay, Delay Skew, NEXT, PSNEXT ELFEXT PSELFEXT and return loss.

B. A field tester meeting the requirements set forth in the 568C.2 standard and use the latest version of the Fluke tester or an equivalent.

C. All cabling testing shall be done at not only all points of connectivity to the network, but also at each cable for any breaks or damage to ensure connectivity and compliance with the network and EIA/TIA standards.

D. The testing certification sheets shall be made part of the required "Close-out" documentation. Testing sheets shall include wire map, resistance, length, capacities, Attenuation, NEXT, Propagation Delay, Delay Skew, Return Loss, PSNEXT.ELFEXT and PSELFEXT for installed cable. Cable results of the pass results must be submitted in an electronic and paper format. It must be the full tests results from the tester in its native format. * Pass is NOT acceptable.

5.03 FIBER OPTIC CABLE TESTING

A. The Electrical Contractor shall test all optical fiber cable before installing it. A visual continuity test shall be enough.

B. The Electrical Contractor shall use LAN test equipment such as Fluke or equivalent for all installed fiber optic cabling. This testing documentation shall be completed per the ANSI/TIA 568C.3 requirements and be made part of the required “Close-out” documentation. The tested cable shall also be certified to support the required protocols for selected network applications.

C. For complete and accurate testing for fiber optic cables the Electrical Contractor shall follow the following guidelines:

- Confirm test jumpers are of the same fiber core size and connector type as the cable system.
- Ensure that optical sources are stabilized and have center wavelengths within +-20 nm of the 850/1300 nm wavelength.
- Test set-up and performance shall be conducted in accordance with ANSI/TIA 568C.3 standards.
- Power meter is calibrated at each of the nominal test wavelengths and traceable to the National Institute of Standards and Technology (NIST)
- Contractor must confirm all system connectors, adapters, and jumpers are properly cleaned prior to the measurement.
- System loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 for single mode fibers.
- Electrical Contractor will be testing for end-to-end attenuation. The attenuation shall not exceed manufacturer’s specifications and verified by ETL to ANSI/TIA 568C.3 specifications.

D. The Electrical Contractor must measure the attenuation of each connected link after each installation.

E. If attenuation level results are not acceptable, the contractor must perform OTDR testing on failed cable in order to find out what causes the loss and where it occurs in the cable. The contractor will

make appropriate adjustments or reinstallation of the cable in order for the cable to pass attenuation level results.

5.04 AS BUILT DRAWINGS

A. The Electrical Contractor must provide the architect/engineer with as built drawings in an electronic format compatible to AUTOCAD. No hand-generated drawings shall be acceptable. A paper set and an electronic set shall be provided to the Owner.

B. The Electrical Contractor may acquire the background drawings from the architect/engineer upon request. Contractor's drawings can only be used for this project and may not be altered to perform any other work at this Owner's site. A Twenty-Five dollar ($25) per drawing fee will be charged for every AutoCAD drawing requested.

C. The Electrical Contractor must fill out data information charts and turn them over to the Owner. Information charts must be reproduced in written format as well as electronic format.

5.05 SYSTEM WARRANTY, GUARANTEES, AND MANUALS

A. The Electrical Contractor will provide all system and product guarantees as mentioned in section 2.03 to the Owner no later than 10 days after the contractor has submitted in writing of project completion.

B. The Electrical Contractor will provide the Owner all manufacturer manuals for all the installed equipment. Manuals should be clearly labeled and must be provided in some sort of binder or folder for storage purposes.

END OF SECTION

DIVISION 27 – COMMUNICATIONS

SECTION 272000 – DATA COMMUNICATIONS NETWORK EQUIPMENT

PART 1 – GENERAL

1.01 GENERAL NOTES

A. The intent of the specification section is to outline the scope of work that the network contractor shall complete as part of their bid and subsequent required design, implementation, service, and installation.

B. All work associated with this contract and its intent shall be coordinated with all other work as furnished and installed by other trades that may or may not interface, interact, or be dependent upon the work herein.

C. The network contractor shall meet all required deadlines for installation and implementation and shall notify the design engineer of any difficulty that he or she faces that may alter these deadlines.

D. The network contractor shall also notify the engineer or the Owner representative of any design discrepancy, site limitation, or configuration which would prohibit the network contractor from a successful and timely installation. Failure to notify these parties shall result in the network contractor's sole responsibility for it.

E. The network contractor shall be solely responsible for ascertaining, determining, and subsequently paying the appropriate prevailing wage rates for the work herein. The design engineer and the Owner will be held harmless from these and any decisions that the network contractor reaches that pertain to the network contractor's work.

1.02 PROJECT DESCRIPTION

A. The following specifications are for the installation of network equipment and services.

1.03 BIDDERS QUALIFICATIONS

A. All prospective bidders must be certified installers for all equipment listed.

B. All prospective bidders must possess a minimum of five (5) years continuous experience as a firm doing business under the same name, engaged principally as a network contractor for the work proposed.

C. All prospective bidders must maintain an experienced technical and in house organization for the project and must maintain an office facility with full-time employees in a commercial space.

D. All prospective bidders shall be able to provide the Owner with the appropriate manufacturer’s warranty and service on the proposed equipment.

E. All prospective Bidders will maintain a staff of trained, certified technicians for equipment being specified for said job.

F. A list of projects completed within the last year with contact names and telephone numbers is to be provided.

1.04 CONTRACT SUPERVISION

A. The Electrical Contractor will assign a competent project manager that will be responsible for the project.

B. The Owner reserves the right to request a change of project managers if the original project manager does not perform to Owner's standards.

1.05 GENERAL PROVISIONS

A. All network installations and configurations shall be performed by a network contractor who is certified in this field. This network contractor shall be referred to as the "Network contractor" for the remainder of this specification.

B. Where the word "Provide, is used, it shall be defined as requiring the furnishing and installing of all items indicated, complete in all respects and ready for operation unless otherwise specifically noted.

C. The network contractor shall be responsible for furnishing all labor, superintendence, materials, tools, equipment, and sources necessary for the complete installation of all work for the technology implementation as shown on the plans and as herein specified.

D. It is the intent of these specification and the accompanying plans that the network contractor provides a system complete in every respect and ready to operate. All miscellaneous items and accessories required for such installation whether or not each such item or accessory is shown on the plans or mentioned in these specifications shall be furnished and installed.

E. Where the word active components is used it refers to all network equipment such as switches, routers, and modems that process data traffic.

1.06 VERIFYING EXISTING CONDITIONS

A. The network contractor shall, prior to submitting his/her bid, examine all the existing site (s) /building (s), etc. that are in any way dependent upon the work herein.

B. The network contractor shall, in writing, accompanying his/her bid, report to the engineer of any discrepancy or existing condition which would prohibit him/her from performing his/her work to its full extent - a complete and acceptable project.

C. No "Waiver of Responsibility" for inadequate, incomplete, or defective work will be considered or accepted by the Engineer unless written notice of a difficulty arising from any existing condition is made part of this network contractor's bid.

1.07 GENERAL SPECIFICATIONS

A. The following specifications are for the sole purpose of providing the Owner with a complete and thorough Local Area Network with Internet connectivity.

B. All active components such as switches and routers are part of this contract and thus the network contractor will install and configure such equipment.

C. All inactive components such as the cabling, jacks, racks, surface raceway and such are part of this contract and thus is the responsibility of the Division contractor to supply and install such.

D. Workstations and any software running within the workstations are outside of this scope and thus not part of this contract.

E. Wherever a discrepancy occurs in the specifications or the drawings or between the drawings and the specifications the network contractor will accept the engineer's interpretation of such issue(s).

1.08 MATERIALS

A. The Network Contractor will supply a list of materials for the Owner. The list of equipment that shall be provided and configured, must be defined by the Owner, along with closet location.

B. All active component material should include ten percent additional ports for closet's up to 100 drops, five percent for closets 101 to 300 drops, and 2.5 percent for closets over 301 drops.

C. It is the responsibility of the network contractor to provide, install and configure all materials or equipment mentioned or not mentioned throughout this package in order to achieve a complete and thorough network solution as described previously.

D. It is the responsibility of the network contractor to notify the engineer in writing if there are any conflicts with the materials or products the engineer has specified that will make a complete network system installation impossible or difficult.

PART 2 – SCOPE OF WORK

2.01 INSTALLATION CHECKLIST

A. The Network contractor shall have the following information in order to install a complete and accurate job:

- The Design Documentation Project Manual.

2.02 WORK INCLUDED

A. The network contractor shall provide and install all specified equipment. Installation of such equipment includes the racking and stacking of all switches and routers.

B. The network contractor must configure all specified equipment.

C. Owner requirements such as VLANS, IP Addressing, Security etc. shall be discussed and documented with the network contractor prior to the submittal.

D. It is the responsibility of the network contractor to obtain the most recent patches, builds, drivers and upgrades, for all active networking components. These devices will be upgraded, flashed, and configure to the most recent set of available standards prior to turning the system over for Owner use.

E. The network contractor must supply network management software, which will recognize all new equipment, and existing Owner equipment.

F. Network contractor will be responsible for providing and installing all specified patch cables at the wire closet.

2.03 GUARANTEE/WARRANTY

A. The network contractor will be able to provide manufacturer's warranty to the Owner.

B. Any failed equipment of material shall be the responsibility of the network contractor and shall be replaced immediately.

2.04 WORK SCHEDULING

A. The network contractor must submit, in writing to the Owner, a schedule of the work that will be performed, and indexed by building.

B. The network contractor must adjust his/her work schedule and working hours according to the Owners schedule. It is the responsibility of the network contractor to coordinate his schedule with that of the Owner.

C. The network contractor's work will not be allowed to interfere with the Owner's daily work schedule unless given direct permission from the organization.

D. The network contractor will be responsible for cleaning up any debris caused during the installation after each work period (daily).

E. The network contractor must secure all network active components at the end of the work period.

F. The Owner assigned personnel shall perform a visual inspection at the end of the workday in order to determine that the network contractor is following proper procedures.

G. Network Contractor must notify the Owner if they will be removing any existing network equipment.

H. The network contractor must notify Owner assigned personnel of any conditions that might cause a delay in the completion of the project.

I. The network contractor must coordinate with Owner assigned personnel for a storage location(s)at the site.

PART 3 – MATERIALS

3.01 ACTIVE COMPONENTS

A. The equipment list of all materials, such as switches, router, and associated materials, will be supplied to the Owner for approval.

3.02 PATCH CABLES

A. Network contractor must provide all Category 6 patch cables at all wire closets.

PART 4 – DETAIL SPECIFICATION

Not Applicable

PART 5 – PROJECT CLOSE-OUT

5.01 GENERAL PROVISIONS FOR TESTING

A. Before final application is considered for review the network contractor must submit all test results to the Owner in order for them to be reviewed and accepted.

B. The Owner assigned personnel can be present during such testing and will be able to inspect network contractor installation and workmanship.

C. Any work that does not comply with specifications mentioned throughout this specification package or industry standard shall be replaced and reinstalled at network contractor's expense.

5.02 SYSTEM WARRANTY, GUARANTEES AND MANUALS

A. Data network contractor will provide all system and product guarantees as mentioned to the Owner no later than 10 days after network contractor has submitted in writing of project completion.

B. Network contractor must notify the Owner of how guarantees and warrantees should be handled, and network contractor must fill out all the warranty cards for all the active components for the Owner.

C. Network contractor will provide the Owner all manufacturer manuals for all the installed equipment. Manuals should be clearly labeled and must be provided in some sort of binder or folder for storage purposes.

D. All documentation, software, license agreements, etc. shall be turned over to the Owner upon completion of the project.

END OF SECTION

DIVISION 27 – COMMUNICATIONS

SECTION 275116.10 – PUBLIC ADDRESS SOUND SYSTEM – MODIFY/ EXPAND EXISTING SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes, but not limited to:

1. Conduit and wiring necessary to connect the existing PA head end to area speakers and/or intercom handsets in new or renovated areas.
2. Pre-assembled drop-in ceiling speakers
3. Recessed ceiling speakers
4. Surface mounted box speakers – wall or ceiling
5. Outdoor rated reentrant horn speakers
6. Desk Mounted Administrative Telephone
7. Desk or Wall Mounted Staff Telephone
8. Desk or Wall mounted intercom handsets
9. Volume Controllers
10. Voice Activated Relays

C. Work scope:

1. Work shall include any or all the following:

a. Removal of existing devices no longer required as a result of demolition activities in the project area, as indicated in the Drawings. Demolition work shall include removal of device(s), the removal or surface mounted or exposed backboxes, or the abandonment of recessed backboxes, and removal of any associated wiring, and raceways rendered obsolete by the demolition. It shall also include any programming required to remove such devices from the system. All removed devices shall be turned over to the Owner, unless otherwise noted.

b. Removal and re-installation of existing devices and/or associated wiring to accommodate new finish work or equipment replacements by others.

c. Re-location of existing devices and/or wiring associated with renovated areas. Work shall include all wiring extensions as per code and manufacturer specifications to serve the device at its new location.

d. Addition of new devices, backboxes, grilles and wiring to serve new or renovated areas as shown on the drawings. Included in this work shall be all programming required to integrate the new devices into the system. New devices can include, but not be limited to:

1) Public address speaker(s), ceiling or wall-mounted, surface or recessed mounted.
2) Call initiation switches capable of placing normal, urgent or emergency calls.

3) Wall-mounted paging horns
4) Handsets
5) Volume controllers
6) Take over relays to take over standalone sound systems that may be present in Auditoriums, Cafeterias, Gymnasiums, etc.

2. It is the declared intent of this specification that the end result of the system modifications shall be a complete and operational Public Address system. Provide all required amplifiers, power supplies, batteries, interfaces, programming, inspections, testing, etc. to achieve this result whether or not specific devices are shown on the drawings or are included in this specification.

1.02 SUBMITTALS

A. Product Data: Submit manufacturers standard catalog cuts, specifications and installation instructions for all new devices, components, etc. including wiring. Catalog sheets shall be clearly highlighted to show selected models, accessories, options etc.

1.03 QUALITY ASSURANCE

A. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

B. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 5 years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.

C. The contractor shall show satisfactory evidence, upon request, that he or she maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his or her facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

1.04 SINGLE SOURCE RESPONSIBILITY

A. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and minimum of 35 years' experience in the industry. The supplying contractor shall have attended the manufacturer's installation and service school. A certificate of this training shall be provided with the contractor's submittal.

1.05 SAFETY / COMPLIANCE TESTING

A. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as ETL and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under direction of a qualified and factory approved distributor, to the approval of the owner.

B. The system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory-keyed plugs designed for fault-free connection.

C. The printed circuit card of the card cage shall be silk-screened to indicate the location of each connection.

1.06 WIRING

A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall test free from all grounds and shorts.

B. All communication system wiring shall be labeled at both ends of the cable. All labeling shall be based on the room numbers as indicated in the architectural graphics package..

1.07 PROTECTION

A. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

B. The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

1.08 WARRANTY

A. Replace/repair, within the warranty period as specified in the General or Special Provisions of the Contract, all equipment with inadequate and/or defective materials and workmanship, including leakage, breakage, improper assembly or failure to perform as required; provided that the manufacturer's instructions for handling, installing protecting and maintaining units have been adhered to during warranty period. Warranty shall include all component replacement costs, including labor and wring for removal and reinstallation. Such warranty shall be required of the installing contractor even if in excess of original manufacturer warranties.

1.09 PROJECT CONDITIONS

A. The existing public address system shall remain in service throughout the project, except as described below.

B. Interruptions of existing Public Address service: Coordinate any required shutdowns with Owner to tie in new devices. Outages shall only be scheduled during off hours, weekends, holidays etc. when the building is not in use. Include all premium time on bid.

1. Notify Architect, Construction Manager, Owner no fewer than two-days in advance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All new equipment and wiring shall be compatible for use on the existing system. Manufacturer's specified herein are intended to set quality of product, and not set a requirement to match a given manufacturer's equipment to an existing system.

B. The functionality of the system in new or renovated areas shall meet or exceed that of the existing area or those of similar areas in the building, whichever is greater.

C. The Specifying authority must approve any alternate system.

D. The intent of this specification is to establish a standard of quality, function and features. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications.

E. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

2.02 SPEAKERS

A. Pre-assembled drop-in classroom / corridor ceiling speakers shall be listed to UL 1480 and consisting of the following for use on 2' X 2' or 2' X 4' grid suspended ceiling systems:

1. Fully enclosed industrial grade steel assembly.
2. A 2' X 2' perforated grill over the entire front
3. Non-reflective bright white finish,
4. 8"dia. Cone speaker with 10 oz. magnet and tweeter, and 25/70V transformer,
5. Five (5) power taps at 4W, 2W, 1W, 1/2W & 1/4W selectable by rotary switch.
6. Output shall be 94 dB at 1 W / 1 meter and frequency response of 95 Khz to 20 Khz,
7. Four (4) attachment points
8. Tile support for use in 2' X 4' ceiling grid systems.
9. Provide drop-in ceiling speaker assembly, Bogen #CSD2x2/U or equal.

B. Recessed classroom / corridor ceiling speakers shall be 8" cone-type loudspeaker having a frequency response of at least 50 Hz to 12 kHz. Axial sensitivity shall be 95 dB, measured at 1-watt/4-feet. The loudspeaker shall have a 6 oz. ceramic magnet and a ¾" voice coil. A transformer capable of matching an 8-ohm loudspeaker to a 25-volt or 70-volt line and providing power taps of 4W, 2W, 1W, 1/2W and 1/4W shall be included. The loudspeaker shall be assembled on a 13" steel ceiling grille, finished in bright-white semi-gloss enamel. The assembly depth shall be 3-1/4". Provide Bogen Model #S86T725PG8U or equal.

C. Surface mounted metal box speakers shall include an 8" paper cone speaker with 6 oz. magnet. Frequency response shall be 110 Hz to 15 Khz. Dispersion angle shall be no less than 100°. Sensitivity shall be a minimum of 96 dBspl, measured 1 watt @ 1 meter, on axis. The unit shall incorporate a transformer capable of matching an 8-ohm loudspeaker to a 25-volt or 70-volt line and providing power taps of 4W, 2W, 1W, 1/2W, 1/4W and 1/8W. The speaker enclosure shall be full steel construction and allow for surface mounting and contain Wiremold knockouts. The enclosure shall be painted off-white.

1. Wall mounted units shall be sloped front, angled at 12.5 degrees downward and measuring 11-5/8"W X 11-5/8"H X 4-1/4"D (top) and 3-1/8"D (bottom). Provide Bogen Model #MB8TSQ or equal.

2. Ceiling mounted units shall be flat front measuring 11-5/8"W X 11-5/8"H X 4-1/4"D. Provide Bogen Model #MB8TSL or approved equal.

D. Outdoor speakers shall be reentrant type horn loudspeaker having a frequency response of 225 Hz to 14 KhZ. Rated power shall be 30 Watts, RMS continuous, Sound pressure level as measured 4' on axis with 30-Watt input at 100 Hz shall be at least 125dB. The unit shall incorporate a 7-position weather-sealed switch, to allow matching the loudspeaker to a 35V or 70V constant voltage line. Power handling capacity shall be adjustable to 1.8, 3.7, 7.5, 15, 30 Watts @ 70V, or 1.8, 3.7, 7.5, or 15 Watts @ 25V.

1. The speaker shall be weatherproof, all metal construction, with driver enclosed within a weatherproof housing. The loudspeaker shall include a self-aligning, filed replaceable diaphragm. Screw terminals shall be provided for connection to the audio line.
2. An all-purpose mounting bracket shall provide precise positioning in the vertical and horizontal planes with a single adjustment. The bracket shall include banding slots to permit mounting the loudspeaker on beams or pillars.

3. Bracket and speaker shall be finished in mocha enamel.

4. Provide with wire guards where installed outdoors or other areas subject to impact.

5. Provide Bogen #SPT30A or equal.

2.03 TELEPHONES

A. The enhanced desk staff station telephone(s) shall be a BOGEN Model MCESS desk-type telephone, or approved equivalent.

1. The unit shall be a standard DTMF-dialing telephone with 12-positive action pushbuttons. Phones which provide membrane-type push-button switches shall not be accepted as an equal.

2. The telephone shall be constructed of molded high-impact ABS finished in a permanent beige color. The receiver shall contain a dynamic receiver and cardon transmitter. A coil cord, terminated in standard modular plugs, shall be supplied to connect the handset to the telephone base.

3. The enhanced staff telephone shall permit rapid, efficient, and reliable control of the operational features available to enhanced staff stations in MULTICOM 2000 Communication Systems. The specific features available shall be determined by the station’s access level, as assigned during the initial system configuration programming.

4. When the enhanced staff station is equipped with the telephone alone, connection to the MULTICOM 2000 System shall require only 2 wires. When the enhanced staff station is equipped with the telephone and a loudspeaker, connection to the MULTICOM 2000 System shall require a shielded pair plus one conductor.

5. The telephone shall require 5-1/2" x 9" of desk space and shall be supplied with a modular cord and surface-mounting junction box.

B. The wall mounted enhanced staff station telephone(s) shall be a BOGEN Model MCWESS/V wall-mounting telephone, or approved equivalent.

1. The unit shall be a standard DTMF-dialing telephone with 12-positive action pushbuttons. Phones which provide membrane-type push-button switches shall not be accepted as an equal.

2. The telephone shall be constructed of molded high-impact ABS finished in a permanent beige color. The receiver shall contain a dynamic receiver and car-don transmitter.

3. The enhanced staff telephone shall permit rapid, efficient, and reliable control of the operational features available to enhanced staff stations in MULTICOM 2000 Communication Systems. The specific features available shall be determined by the station's access level, as assigned during the initial system configuration programming.

4. When the enhanced staff station is equipped with the telephone alone, connection to the MULTICOM 2000 System shall require only 2 wires. When the enhanced staff station is equipped with the telephone and a loudspeaker, connection to the MULTICOM 2000 System shall require a shielded pair plus one conductor.
5. The telephone shall require 4" x 9" of wall space. It shall be supplied with a wall-mounting plate which shall fit a standard single-gang box (not supplied). The plate shall be equipped with a modular jack.

6. The unit shall have a 30” armored handset cord.

2.04 ACCESSORIES

A. Volume Controller – UL Listed single gang, 20W ten-step, continuous rotary, audio level attenuator with OFF position. Brushed, stainless steel faceplate with embossed positions and black knob with white indicator mark. Install in standard 2-1/8” deep electrical box. Provide Quam #QC-10 or equal.

B. Voice Activated Relay – DPDT relay device activated when an audio signal is detected at the microphone pre-amp or at the 70V, 25V or 600-ohm line level inputs. A slide switch shall be provided to allow selection of the pre-amp or line inputs. A VOX detect circuit shall be provided and shall include sensitivity and delay controls. The audio output shall be an isolated 600-ohm transformer. Line impedance shall be 600 ohms, with a frequency response of 100 Hz to 10 kHz. Sensitivity and delay shall be controlled by recessed potentiometers. Time delay range Shall be adjustable from approximately 0.25 to 25 seconds. The MIC pre-amp shall provide 62dB gain, with volume control via a recessed potentiometer. The frequency response of the MIC pre-amp shall be 200 Hz to 10kHz. Output signal to noise ration shall be 55 dB. Provide with a 12V to 24V DC power source to operate the relay. Provide Bogen #VAR-1 or approved equal.

2.05 WIRING

A. All wiring shall be plenum rated. Wiring shall be done per manufacturer's recommendation, West Penn #25357. All terminal connections to be on barrier strips. All cables to be labeled by room.

PART 3 - EXECUTION

3.01 FIELD CONDITIONS

A. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Integrated Telecommunications/Time/Audio/Media System.

B. Do not proceed until unsatisfactory conditions have been corrected.

C. Prior to performing any work, perform a test of the devices in the work area to confirm existing operational status. Report any non-functional devices to the Owner’s Representative for corrective action to be taken, if any, at Owner expense. Devices not functioning after this test shall be considered as Contractor fault and shall be repaired or replaced at Contractor expense.

3.02 INSTALLATION

A. The installation, adjustment, testing and final connection of all conduits, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with manufacturer’s approved shop drawings.

B. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.

C. All classroom phones shall be wall mounted.

1. Mount at 54" AFF.
2. All wiring should be concealed.
3. Verify exact location with Architect.

D. All Administrative Phones shall be desk- or counter-mounted.

1. Provide standard wall 120V AC receptacle 16" AFF
2. Verify exact location with Architect.

E. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.

F. Connect field cable to each speaker transformer using UL butt splices for 22 AWG wire.

G. Terminate field wiring on wall adjacent to rack using Telco 66 type blocks. Provide neat cross connect system for wiring. Wiring to be labeled to indicate final architectural room number that it services on the Telco block.

H. Rack shall be labeled in numerical order with speaker/phone combinations first, speaker/outside horn combinations last. Labeling and order shall reflect final Architectural room numbers posted outside the rooms. Use three- (3), four- (4), five- (5), or six- (6) digit dialing extensions.

I. Mark and label all telephone outlets and/or set with the graphic room numbers. Label all demarks IDF and MDF points with destination point numbers. Rooms with more than one outlet shall be marked XXX-1, XXX-2, XXX-3, etc. where XXX is the room number.

J. No graphic room number shall exceed the sequence from 000001 through 899999.

1. All outside speakers shall be on a separate page zone and time zone.
2. All zones shall be laid out not to exceed 10 watts maximum audio power zone.
3. All hallway speakers shall be tapped at 1 watt maximum.
4. All outside horns shall be tapped at 7.5 watts maximum.
5. All classroom speakers shall be tapped at ½ watt maximum.
6. Large rooms, such as cafeterias, shall be tapped at 2 watts maximum.

K. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.

L. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

M. Cable identification: Cable conductors shall be color-coded, and individual cables shall be individually identified. Each cable identification shall have a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.

N. Shielding: Cable shielding shall be capable of being connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

O. Provide all system programming necessary to fully integrate new / modified devices into the system.

P. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.

3.03 GROUNDING

A. Provide equipment grounding connections for Integrated Telecommunications/Time/Audio/Media System as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.

C. The contractor shall note in his drawing, the type and locations of these protection devices as well as all wiring information.

PART 4 - DOCUMENTATION

4.01 DOCUMENTATION

A. Provide the following directly to the Supervisor of Technology Service.

1. Provide a printed copy of all field programming for all components in system.

2. Provide one copy of all diagnostic software with copy of field program for each unit.

3. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.

4. Provide one copy of all field wiring runs, location, and end designation of system.

END OF SECTION

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 282100 – SURVEILLANCE CAMERAS

PART 1 – GENERAL

1.01 QUALIFICATIONS

A. The Electrical Contractor shall include the services of a qualified NY State licensed Security Contractor to furnish the specified devices and to integrate them into a complete and operable Safety – Security System.

B. The Electrical Contractor shall provide a reference list of five similar sized projects installed within the last three years by the Security Contractor including the name of the person and telephone number of the person to contact at each location. A site visit to any of these locations shall be arranged with the Owner's representative. This is a mandatory requirement.

C. At the time of bid, it is assumed that the bidder is provided the exact system(s) as specified or a system that is equal or better. Failure to meet these requirements will result in disqualification. See also section 1.03 "Alternate Systems".

1.02 SCOPE OF WORK

A. The intent of this specification is to describe the minimum system requirements selected after exhaustive competitive analysis of available features offered by major suppliers of Security Alarm Systems for an integrated Safety – Security System.

B. System integrity must be constantly supervised and alert administrative personnel of defects and system anomalies.

C. Installation of all conduits, cable, security equipment, and power wiring shall be provided by a duly licensed Master Electrical Contractor, licensed in the Country and Town in which the work is to take place.

D. The Electrical Contractor shall also include all costs to properly supervise the installation of the security system by the Security Contractor. This supervision shall include furnishing the equipment as specified, proper location of devices, assistance to the Owner in procurement of the telephone devices, lines and services, testing of all system components, training of operating personnel, and full field service during the two- year warranty period.

   1. The installation shall be accomplished in a workmanlike manner and in strict accordance with manufacturer's requirement and all applicable codes governing this type of installation. All connections and/or splices shall be made only in junction boxes using approved crimp-type connectors and with any special tools recommended by the connector manufacturer. All cables and wiring shall be supported properly by the Electrical Contractor, above hung ceiling, or run where Owner/Engineer has given written approval.

E. All microprocessor-based communication security monitoring components shall be submitted, supplied, installed, tested, commissioned, documented, and demonstrated to the Owner's personnel by a factory trained and certified security system distributor/technician.

F. The Security Contractor shall include all costs associated with providing 8 sets of submittals for the Engineer which shall include working drawings showing proper interconnect wiring between all devices. Also furnish a typed operational narrative on the system including all sequences of operation for the use by the operators and for training purposes. It shall explain in detail how the

system operates and how to operate the system. Manufacturer's specification sheets will not be accepted for the operational narrative. All of these items shall be submitted in a suitable binder, labeled accordingly.

G. The Security Contractor installer shall provide installation and supervision for new system, as well as program all alarm panels and central station computer as per the existing protocol.

H. The Security Contractor shall provide integrated installation drawings on blue line and electronic format. No hand drawings will be accepted.

I. The system shall consist of IP based fixed cameras with appropriate housings, lenses and mounting brackets, Network Video recorders, software, licenses and any switches, hubs, routers, power supplies and plenum rated cables necessary to meet the specifications as shown in Part 2 of this document.

J. The bidder shall propose the appropriate network to meet the design intent of this specification. Bidder shall be responsible for all network configuration of provided equipment as well as submitting with their response any configuration changes that need to be made to the existing network to support the proposed system and meet design objectives.

K. The system shall be capable of recording images from all cameras for a minimum of 10 fps, Normal quality at VGA resolution. This recording shall be retained for no less than two(2) weeks. The system shall be designed with distributed recorders located at each Owners operated site/facility to ensure that the network load is distributed across the network.

L. The system shall be capable of displaying live images from any camera at 30 fps using MPEG-4 onto any client PC with appropriate bandwidth.

M. The proposed system shall support the 802.11af Power over Ethernet standard for all cameras. Bidders may provide 802.11af compliant switches, mid-spans, power injectors or a combination of devices as they feel necessary to provide power to all camera locations. Bidders shall insure that 15 Watts PoE is delivered to all external cameras and 7.5 Watts PoE is delivered to all internal cameras.

N. Cameras shall be located in such a manner as to cover the areas as identified in the drawings for each school building. In addition, **the successful bidder shall provide a JPEG image from each proposed camera location showing the camera view from that location. These views shall be signed off by the designated school administrator.**

O. The system shall be configured to permit the remote viewing of all recorders at all school buildings using a single computer with software meeting the specifications as shown in section 2.07.

P. The system must be capable of working with the existing connectivity between the school buildings. The bandwidth of the streams shall be adjusted in order to permit the streaming of video over these connections. Priority shall be given to the quality of the video over frame rate.

1.03 ALTERNATES

A. This specification section is based upon equipment manufactured by those companies listed herein.

B. Any Security Contractor, submitting alternate systems, must be Approved by the Owner's representative. Any Security Contractor requesting approval must follow these guidelines:

1. Demonstrate the proposed system to the Owner's personnel and representatives.

2. Provide a letter from Underwriters Laboratories that the proposed product is UL listed as a system.

3. Provide a letter from the manufacturer stating the Security System installer's technical personnel have attended factory-trained seminars and are certified to support the product to the Owner.

4. Through the demonstration process, indicate how the proposed system meets or exceeds the specifications. Demonstrate to the Owner all system functions.

5. Furnish factory data sheets on every piece of equipment proposed.

6. Complete lists, descriptions, and drawings or materials to be used.

7. A complete list of current drain requirements during normal Supervisory conditions, trouble conditions, and alarms conditions.

8. Battery standby calculations showing total standby power needed to meet the system requirements as specified.

9. Furnish a line-by-line specification review indicating compliance non-compliance for each function in wiring.

10. Obtain written acceptance of the proposed system from the Owner, Architect, and Engineer.

C. Substitute supervised systems will be considered providing the bidder has submitted the complete system documentation to the Architect. The submission must be complete and meet or exceed all criteria described in this specification. There will be no exceptions to this requirement.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Cameras - Axis or equivalent

B. Milestone Xprotect Expert Software or equivalent

2.02 HOUSING AND MOUNTINGS

A. An appropriate housing and mounting bracket shall be selected to permit the camera to be mounted in the selected location if required.

B. An appropriate weatherproof housing meeting IP66 standard shall be selected for any exterior mounted cameras. All fixed outdoor cameras shall be mounted using wall mount bracket PWM484S or equivalent and provide mounting hardware appropriate to the mounting surface.

PART 3 - WARRANTY

3.01 WARRANTY

A. Products proposed must be warranted against defects in materials or workmanship, as follows:

1. Three Years Parts / Three Years Labor

a. Fixed CCTV, Hard Disk Drives installed in Network Video Recorders.

2. One Year Parts / One Year Labor

   a. Plasma Display Panel, Hard Disk Recorders, Extension Units, Digital Video Disc Recorder (DVD-RAM), Video Network / Transmission Equipment, Software, Lens, and Accessories.

B. Defective products must be repaired or replaced at the discretion on the manufacturer.

END OF SECTION

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 284613.10 – FIRE ALARM SYSTEM (MODIFY EXISTING)

PART 1 – GENERAL

1.01 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes, but not limited to:

1. Conduit and wiring necessary to connect the existing FACP to alarm initiating devices, notification appliances and auxiliary equipment.
2. Addressable manual fire alarm stations
3. Addressable analog area smoke detectors
4. Addressable analog duct smoke detectors
5. Addressable analog heat detectors
6. Carbon Monoxide Detectors
7. Connections to sprinkler waterflow alarm switches
8. Connections to sprinkler supervisory switches and tamper switches
9. Audible and visual combination notification appliances
10. Air handling systems shutdown relays
11. Elevator recall/shunt relays (if the building has an elevator)
12. Battery standby

C. Work scope:

1. Work shall include any or all of the following:

a. Removal of existing devices no longer required as a result of demolition activities in the project area, as indicated in the Drawings. Demolition work shall include removal of device(s), the removal or surface mounted or exposed backboxes, or the abandonment of recessed backboxes, and removal of any associated wiring, and raceways rendered obsolete by the demolition. It shall also include any programming required to remove such devices from the system. All removed devices shall be turned over to the Owner, unless otherwise noted.

b. Removal and re-installation of existing devices and/or associated wiring to accommodate new finish work or equipment replacements by others.

c. Re-location of existing devices and/or wiring associated with renovated areas. Work shall include all wiring extensions, backboxes as per code and manufacturer specifications to serve the device at its new location.

d. Addition of new devices, backboxes and wiring to serve new or renovated areas as shown on the drawings. Included in this work shall be all programming required to integrate the new devices into the system.

2. It is the declared intent of this specification that the end result of the system modifications shall be a complete and operational fire alarm system. Provide all required expansion modules, power supplies, batteries, interfaces, programming, inspections, testing, etc. to achieve the result whether or not shown on the drawings.

3. Maintain existing fire alarm devices affected by Project Work for renovated space, including areas affected by asbestos abatement within existing zones. This would require disconnection, reconnection and commissioning of existing devices during installation of new ceiling systems.

1.02 DEFINITIONS

A. LED: Light-emitting diode.

B. NICET: National Institute for Certification in Engineering Technologies.

1.03 REFERENCES

A. General:

1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

2. Unless otherwise noted, the edition of the referenced code or standard that is current at the time of the “date of record” for the Work shall be considered the effective code or standard for the duration of the project.

3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

4. Refer to specific Division 26 Sections for additional referenced codes and standards:

a. ANSI/NFPA 70 - National Electrical Code.
b. ANSI - American National Standards Institute.
c. ASME A17.1 Safety Code for Elevators and Escalators
d. FM - Factory Mutual System.
e. NFPA – National Fire Protection Association
f. NFPA 72 - National Fire Alarm Code
g. UL – Underwriters' Laboratories:

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, provide Manufacturer’s standard catalog sheets, specifications, and installation instructions. Catalog sheets shall be clearly highlighted to show selected models, accessories, options etc.

B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, riser diagrams and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.

2. Include battery-size calculations for revised service.

3. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

4. Include revised riser diagram complete with devices labeled with Project room numbers and device address number.

5. Include floor plans to indicate final device locations and showing address of each addressable device. In addition, indicate applicable candela settings and tap settings of each notification device.

C. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified fire-alarm technician, Level III minimum.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," deliver copies to authorities having jurisdiction and include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.

B. Operational Documentation:

1. Program Software Backup: On magnetic media or compact disk, complete with data files and passwords.

2. Device address list.

3. Updated O&M Manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.

2. Keys and Tools: One extra set for access to locked and tamper-proofed components.

3. Fuses: Two of each type installed in the system.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.08 WARRANTY

A. Provide and submit written warranty, signed by the manufacturer, agreeing to replace/repair, within the warranty period, all equipment with inadequate and/or defective materials and workmanship, including leakage, breakage, improper assembly or failure to perform as required; provided that the manufacturer's instructions for handling, installing protecting and maintaining units have been adhered to during warranty period. Warranty shall include all component replacement costs, including labor and wiring for removal and reinstallation. Such warranty shall be required of the installing contractor even if in excess of original manufacturer warranties.

1. Warranty period: In conformance with the requirements of the Contractor's Guarantee within Specification Section 017000, beginning upon completion of equipment installation and commissioning.

1.09 PROJECT CONDITIONS

A. The existing fire alarm system shall remain in service throughout the project, except as described below.

B. Interruptions of Existing Fire Alarm service: Coordinate any required shutdowns with Owner to tie in new fire alarm devices. Outages shall only be scheduled during off hours, weekends, holidays etc. when the building is not in use. Include all premium time on bid. Provide any required fire watches.

1. Notify Architect, Construction Manager, Owner no fewer than two-days in advance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work. The manufacturer's equipment must be listed for use and function with the existing FACP.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices as applicable to the facility:

1. Manual stations.
2. Smoke detectors.
3. Heat Detectors.
4. Beam Detectors.
5. Fire suppression system operation
6. Automatic sprinkler system waterflow device activation.

B. Fire-alarm signal shall initiate the following actions as applicable to the facility. Any operation sent out from the main FACP shall remain as is prior to this project.:

1. Continuously operate alarm notification appliances.

2. Identify alarm at fire-alarm control unit and remote annunciators.
3. Send alarm signal to central monitoring station.
4. Release fire and smoke doors held open by magnetic door holders.
5. Shutdown of fans rated 1000cfm or greater.
6. Close smoke dampers in HVAC duct systems.
7. Recall elevator(s) to primary or alternate recall floors.

C. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Loss of primary power at fire-alarm control unit.
3. Ground or a single break in fire-alarm control unit internal circuits.
4. Abnormal ac voltage at fire-alarm control unit.
5. Break in standby battery circuitry.
6. Failure of battery charging.
7. Abnormal position of any switch at fire-alarm control unit.
8. Communication loss with any network panel.
9. Amplifier panel loss on voice notification system.
10. Activation of any Carbon Monoxide Detector.

D. System Supervisory signal initiation shall be by one or more of the following devices or actions:

1. Sprinkler Tamper Switch activation.
2. Duct detector activation.
3. Low pressure switch activation on dry pipe sprinkler system.

E. System Trouble and Supervisory Signal Actions: Any operation sent out from the main FACP shall remain as is prior to this project.

1. Annunciate at fire-alarm control unit and remote annunciators. Send trouble / supervisory signal to central monitoring station.

2. For carbon monoxide detector activation – in addition to above, activate local sounder base of the affected device and any associated carbon monoxide notification devices.

2.03 FIRE-ALARM CONTROL UNIT - EXISTING

A. The existing FACP is as shown on the drawings.

B. Fire alarm circuits, subject to compatibility with the existing panel, shall be as follows:

1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.

a. Initiating Device Circuits: Style B.
b. Notification Appliance Circuits: Style Y.
c. Signaling Line Circuits: Style 4.
d. Install no more than 80% addressable devices on each signaling line circuit.

2. Serial Interfaces: Two RS-232 ports for printers.

C. Notification Appliance Circuit operation shall remain as is prior to this project. Operation shall sound in a temporal pattern. All visual notification devices shall be synchronized. Provide NAC Extenders as required.

D. Door hold-open devices that control doors in smoke barrier walls shall be connected to fire-alarm system.

E. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory.

F. Maintain existing automatic transmission of alarm, supervisory, and trouble signals to a remote alarm station.

G. Existing primary power shall remain as is, unless otherwise indicated.

H. Secondary Power: Provide battery calculations to verify if the existing batteries are adequate to meet code requirements after system expansion. Provide additional battery capacity to meet code minimums if required by the addition of new devices.

2.04 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

2. Station Reset: Key-operated switch.

3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Unless otherwise noted lifting covers shall be non-alarmed. Where alarmed covers are called for, lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. Provide STI Stopper II or equal.

4. Design Make: Compatible with and listed for use on the existing system.

2.05 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL-268, operating at 24-V dc, nominal.

2. Detectors shall match and be of the same manufacturer as the existing smoke detectors on the system.

3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.

7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
    b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
    c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL-268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Each sensor shall have multiple levels of detection sensitivity.

4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

5. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

6. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.

2.06 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.07 CARBON MONOXIDE DETECTORS

A. Listed to UL 2075 for Gas and Vapor Detectors and Sensors.

B. The detector shall be equipped with sounder base and trouble relay. The detector base shall be able to mount to a single gang electrical box or direct mount to wall or ceiling.

C. The detector shall provide dual color LED indication which blinks normal, alarm or end-of-life. When sensor supervision is in trouble or end-of-life condition, the detector shall send a trouble signal to the panel. In alarm mode the red LED shall blink in a Temporal 4 pattern and the sounder will sound in in a Temporal 4 pattern.

D. The detector shall provide a means to test CO entry into the CO sensing cell.

E. Operating voltage shall be 12/24 VDC.

2.08 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections. Where used on an existing system containing addressed notification devices, any new devices shall likewise be addressable as well.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

2. Wall mounted notification appliances shall be red color with white lettering. Ceiling mounted notification appliances shall be white color with red lettering.

B. Audible (Horn): Unless otherwise required for compatibility with the existing system: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol. Match existing system devices.

C. Speakers: Unless otherwise required for compatibility with the existing system: High intelligibility across frequency range of 300 to 8000 HZ, 25 or 70 VRMS operation, (5) field selectable taps 1/8 watt up to 2 watts, mountable on 4” square backboxes.

D. Visible Notification Appliances (Strobes): Unless otherwise required for compatibility with the existing system: Xenon strobe lights comply with UL 1971, with clear or nominal white

polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output:
2. 15/30/75/110 cd, selectable in the field.
3. Mounting: Wall mounted unless otherwise indicated.
4. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
5. Flashing shall be in a temporal pattern, synchronized with other units.
6. Strobe Leads: Factory connected to screw terminals.
7. Mounting Faceplate: Factory finished, red (wall mounted) or white (ceiling mounted
8. Match existing system devices.
9. For visible notification devices associated with carbon monoxide detectors – provide the above with the exception of provide with amber colored lens, and shall have either no engraving or the word " ALERT". In NO case shall the engraving "FIRE" be present in these devices.

E. Combination Horn/Strobe or Speaker Strobe: Shall match the criteria of the individual component devices as described above.

2.09 MAGNETIC DOOR HOLDERS

A. Magnetic door holders shall be UL Listed, flush or surface mounted in a single gang box, aluminum color.

B. Magnetic door holders shall be low voltage, AC or DC and compatible with the existing fire alarm system.

C. Magnetic door holders shall have a holding force of 25lbf and shall hold the door open while energized. Doors shall be released upon power failure, or de-energized by means or fire alarm-controlled relay or other switch.

D. Provide with all required hardware for complete operation – including adjustable contact plates etc.

2.10 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Supervised IAM: Match existing system device, or provide compatible device listed for use on the system.

2.11 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, notification device, or other device requiring protection.

B. Factory fabricated and furnished by device manufacturer.

C. Finish: Paint of color to match the protected device.

D. Provide device guards to devices installed in areas subject to physical damage. This shall include, but not limited to, Gymnasiums, Wrestling Rooms, Weight Rooms, Locker Rooms, Shops, Receiving / Loading Areas, Exterior devices.

2.12 FIRE ALARM WIRE AND CABLE

A. Fire Alarm circuits: Install cables in metal J hooks above accessible ceilings and in Wiremold 500 exposed in finished spaces.

B. Manufacturers: Subject to fire alarm system manufacturer's requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Comtran Corp.
2. Genesis Cable Products; Honeywell International, Inc.
3. West Penn Wire/CDT; a division of Cable Design Technologies.
4. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG size as recommended by system manufacturer.

D. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2- hour rating.

E. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.
3. Multi-conductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

PART 3 - EXECUTION

3.01 FIELD CONDITIONS

A. Prior to installation carefully inspect the installed work of other trades, whether pre-existing or part of this project and verify that such work is complete to the point where the installation of the fire alarm system may properly commence.

3.02 EQUIPMENT INSTALLATION

A. General:

1. Comply with NEC, NFPA 72 and manufacturer requirements or installation of fire-alarm equipment.

2. Prior to performing any work, perform a test of the devices in the work area to confirm existing operational status. Report any non-functional devices to the Owner's Representative for corrective action to be taken, if any, at Owner expense. Devices not functioning after this test shall be considered as Contractor fault and shall be repaired or replaced at Contractor expense.

3. Follow Division 260500 Section "Common Work Results for Electrical", for anchorage requirements.

4. Verify dimensions in the field. Lay out work in the most direct and expeditious manner to avoid interference.

5. Coordinate necessary shutdowns of existing systems by notifying the Construction Manager or Owner's Representative a minimum of 10 working days before rendering such systems inoperative. Do not render inoperative any system without the prior approval.

6. Coordinate fire alarm detectors and associated equipment with existing ceiling or roof materials, lighting, ductwork, conduit, piping, suspended equipment, structural and other building components.

7. Coordinate installation of fire alarm system with work of other trades. Protect fire alarm equipment with suitable coverings until completion of Project and remove prior to system turnover.

8. Install initiating devices, control panels, audible signals, connections to equipment provided under other divisions, and related work following equipment manufacturers' requirements for a complete and properly functioning system that will perform specified functions.

B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

C. Devices and raceways installed in new walls or existing stud walls shall be flush mounted with concealed wiring. Devices installed on existing block wall construction shall be surface mounted.

D. Smoke-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.

2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.

3. Smooth ceiling spacing shall not exceed 30 feet. Greater spacing in corridors in accordance with NFPA 72 is permitted.

4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.

5. Locate ceiling mounted detectors not less than 4" from any wall.

6. Locate wall mounted smoke detectors not more than 12" from the ceiling.

7. Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.

8. Locate detectors not closer than 12 inches from any part of a lighting fixture.

E. Duct Smoke Detectors: Comply with NFPA 72. Install sampling tubes so they extend the full width of duct.

F. Fire Alarm manual pull stations shall be mounted no less than 42" and not more than 48" above finished floor to the operable part.

G. Visible Alarm-Indicating Devices shall be installed with the lens at no less than 80” and not more than 96” above finished floor or on the ceiling as indicated. Install all devices at the same height unless otherwise indicated.

H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.03 PATHWAYS

A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed. Support from “j-hooks” or wiring bridles secured to structural members. Fire alarm wiring shall not be supported by the ceiling grid.

B. Exposed pathways located in finished areas shall be installed in surface metal raceway and in EMT in storage, mechanical and utility spaces.

C. Exposed EMT shall be painted to match adjacent areas.

D. Exposed box covers in non-public areas shall be painted red.

3.04 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.

3.05 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

3.06 INTEGRATION

A. New Devices: Perform all required programming to enroll new points into the fire alarm system programming.

B. Removed Devices: Perform all required programming to delete all permanently removed points from the fire alarm system programming.

C. Relocated Devices: Perform all required programming required to relabel alarm points affected by building renovations and re-configurations.

3.07 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction (AHJ).

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.

b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. Coordinate and obtain any inspections required by the Authority Having Jurisdiction to obtain certificate of occupancy. Include any fees in bid.

3. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

4. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.

5. Test audible appliances for the private operating mode according to manufacturer's written instructions.

6. Test visible appliances for the public operating mode according to manufacturer's written instructions.

7. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.08 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 310000 – EARTHWORK

PART 1 - GENERAL

1.01 GENERAL

A. Applicable provisions of the "Conditions of the Contract" shall govern all work under this section.

B. Contractor must observe and adhere to New York Code, 6 NYCRR, Chapter IV and all applicable Subchapters and Parts for the receipt of, or removal, transport, tracking and disposal of all soils and construction waste and debris, as enforced by the New York State Department of Environmental Conservation. All fees associated with testing of materials and debris either at the point of origin (site) or point of termination, are to be borne by the Contractor.

C. Related Documents:

1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections in Division 01 of these Specifications.
2. Section 033000 – Cast-In-Place Concrete
3. Section 310001 – Site Work General Provisions
4. Section 312500 – Erosion and Sediment Controls
5. Section 320117 – Pavement Repair and Resurfacing
6. Section 321216 – Asphalt Paving
7. Section 321216.11 – Asphalt Overlay
8. Section 334000 – Storm Drainage Utilities
9. Other Division 31, 32 & 33 Sections related to the work of the Contract as applicable.

1.02 SCOPE/SUMMARY

A. Provide all labor, materials, equipment, and services and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein, including, but not limited to, the following:

1. Erect and maintain barriers in accordance with all local municipal and state requirements.

2. Remove all obstructions in the way of new construction work which may be required in addition to clearing and removal work specified under Section 310001 – Site Work General Provisions.

3. Excavation and preparation of sub grade for building slabs, floor slabs, depressions and pits, foundations, interior and exterior column footings, walks, stairs, ramps, and pavements. All other excavation which may be required to complete the work and is not specified under other sections.

4. Shoring, sheathing, and pumping.

5. Backfilling all work within building lines to the required grades.

6. Granular fill course for support building slabs is included as part of this work.

7. Excavating and backfilling of trenches within building lines.

8. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances, transformer pads, and conduits for same, underfloor

utility lines, etc. inside or outside of the building footprint.

9. Filling and grading.

10. Finish grading of sub grade.

11. Finished grades.

B. Final grading, together with placement and preparation of topsoil for lawns and planting, is specified elsewhere in Division 32 - Exterior Improvements.

1.03 DEFINITIONS

A. Excavation consists of removal of material encountered to subgrade elevations indicated or required by the work and subsequent disposal of materials removed. Materials to be excavated shall be non-classified and shall include all rock, earth, or other materials encountered in excavating and grading operations for building or site work. The contract price covers the removal of all such materials to the depth and extent indicated on the drawings specified herein or as required to perform the work.

B. Unauthorized excavation consists of removal of materials beyond required sub grade elevations or dimensions without specific direction of the Soils Engineer. Unauthorized excavation, as well as remedial work directed by the Soils Engineer, shall be at the Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with compacted controlled structural fill material or by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.

2. In locations other that those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Construction Manager (when applicable), Architect or the Soils Engineer.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Architect/Engineer, who will make an inspection of conditions. If Architect/Engineer (based upon Soils Engineer's reports) determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by the Soils Engineer.

1. Removal of unidentified unsuitable materials and its replacement beyond the limits required for the construction work as directed will be paid on basis of Conditions of the Contract relative to changes in the work.

D. Sub grade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.

E. Fill is that material removed from excavations or imported from off site borrow areas, predominantly granular, non-expansive soils free from roots and other deleterious matter. Fill material is subject to approval.

F. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

1.04 SUBMITTALS

A. Test Reports: The Contractor shall submit the following reports directly to the Construction Manager (if applicable), the Owner, and the Architect:

1. Test reports on borrow material.

2. Verification of suitability of each footing subgrade material, in accordance with specified requirements including substantiation of and structural capacity of existing rock on which new footings are to bear.

3. Field reports; in-place soil density tests.

4. One optimum moisture-maximum density curve for each type of soil encountered.

5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

C. Use equipment adequate in size, capacity, and numbers to accomplish the work of this section in a timely manner.

D. Engineering, Testing, and Inspection Services: The Contractor shall make arrangements for and the Owner shall pay for a qualified independent geotechnical testing laboratory and associated soil engineer (acceptable to the Owner) to perform soil survey and soil testing service for sampling and testing of materials proposed to be used as well as substantiation and verification of existing subsurface conditions when desired depths of excavation are reached. The Contractor will be responsible for all costs associated with failed tests resulting from their work.

E. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing laboratory and associated soils engineer must demonstrate to the Owner's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the work.

1.06 SOILS ENGINEER (SERVICES AS EMPLOYED AND PAID BY THE OWNER)

A. For site conditions without complex soil problems, a registered soils engineer shall be engaged to perform the following minimum services:

1. Examine on-site materials to determine suitability for use.

2. Recommend locations for placing on-site materials.

3. Recommendations for compacting on-site materials.

4. Determine suitability of soil under footings, foundations.

5. Perform compaction tests and supervise filling operations.

B. Soils engineer's services for problem site conditions shall include the above and the following additional work at minimum:

1. Determine extent of unsuitable material removal.

2. Testing of materials proposed for use from off-site and on-site sources.

3. Dewatering recommendations.

4. Supervising the placing and compacting of approved materials and under footings, foundations, slabs, utility lines, and paved areas.

5. Supervising environmental protection procedures as required by Federal, State, and Municipal Agencies.

   NOTE: Copies of soils reports prepared by soils engineer are to be sent to the Owner, the Architect, and Construction Manager (if applicable).

1.07 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports were used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Construction Manager, The Architect, and the Owner will not be responsible for interpretations or conclusions drawn from these data by the Contractor.

   1. Additional test borings and other exploratory operations may be performed by the Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Examine the areas and conditions under which the work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

C. Set all lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.

D. Existing Utilities: Locate existing underground utilities in areas of excavation work. This work to be substantiated and paid by this Contractor. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations. If damaged, repair or replace at no additional cost to the Owner.

   1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the Owner, the Construction Manager (if applicable) and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

   2. Do not interrupt existing utilities service facilities occupied by the School or others, during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.

   3. Provide minimum 48-hour notice to the Construction Manager (when applicable), Architect, and Owner, and receive written notice to proceed before interrupting any utility.

   4. If service is interrupted as a result of work under this section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.

5. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the Architect and secure his instructions.

6. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

E. Use of Explosives: Use of explosives is permitted for certain types of rock removal only but that use must be substantiated with the Owner, Architect/Engineer, State, and Local Agencies prior to bidding and again prior to commencement of work.

1. The use of explosives is only permitted when the Owner has been notified of same by written notice of the Contractor through Architect/Engineer, thereby permitting the Owner and its surrounding neighbors the required legal notices to vacate and/or protect their properties, buildings, homes, or premises as needed.

F. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

3. Provide all protective measures necessary for the safety of workmen. The above shall be carried out in accordance with and in compliance with regulations of local, county, federal, and OSHA authorities having jurisdiction over same. Protection is entirely the responsibility of the Contractor.

4. The work shall be executed so that no damage or injury will occur to the Owner's property or building, to public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric, or any other pipes. Should any damage or injury caused by the Contractor or anyone in his employ, or by the work under this Contract occur, the Contractor shall, at his expense, make good such damage and assume all responsibility for such injury.

5. The above shall also include the protection of all existing sewers and drainage systems to remain in use within the area affected by the work of this project.

6. Monuments, benchmarks, and other reference features on streets bounding this project shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced.

7. Use every means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

8. Maintain access to adjacent areas at all times.

G. The Contractor is to acquaint himself with the existence and location of all surface and subsurface structures and utilities within the project area. He is not to damage any of those that are to remain, and he is to leave them accessible and make the necessary provisions by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of Architect/Engineer, the local municipality, the utility company involved, and any other agencies having jurisdiction over this project.

H. Prior to entering his bid, the Contractor shall visit the site and familiarize himself with all existing conditions. All nearby existing buildings and utilities shall be inspected by the Contractor prior to

entering his bid.

I. Borings were prepared by others, and provided by the Owner. The Geotechnical Report contained herein shall be reviewed prior to bid. The documents are for information only. Contractor shall interpret for themselves the soil condition underlying the surface of the ground.

J. Perform excavation by hand within dripline of large trees to remain. Protect root systems from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups CG, SC, ML, MH, CL, CH, OL, OH, and PT.

C. Granular Fill: Naturally or artificially graded mixture or natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand meeting requirements for New York State Department of Transportation Standard Specification 304.2.02, Type 4 unless otherwise indicated.

D. Subbase Material: Graded mixture of crushed rock, with 100 percent passing a 2-inch sieve and meeting requirements for New York State Department of Transportation Standard Specification 3.04-2.02, Type 2, unless otherwise indicated.

E. Backfill and Fill Materials: Satisfactory non-expansive soil materials free of organic material, roots, other deleterious substances, clay, rock or gravel larger than 2 inches in any dimension, debris, waste and frozen materials.

2.02 CONTROLLED STRUCTURAL FILL OR MATERIAL

A. Imported controlled structural fill shall consist of inert material that is hard, durable stone and coarse sand, practically free from silts, clay, frozen sections, and foreign substances. It may consist of either natural or washed soil and must be free of organics. The material shall be a well graded mixture, shall have no material larger than 4", and must have the following gradations by weight:

Maximum retained on 3/4-inch sieve:	30%.
Maximum retained on No. 4 sieve:	50%.
Maximum passing 100 sieve:	25%.
Maximum passing 200 sieve:	5%.

This grading shall be determined in accordance with ASTM Standard Specification C117 and C136.

2.03 SUB BASE FILL OR MATERIAL

A. Sub base fill shall consist of inert material that is clean, hard, durable stone, sand, and non-plastic silt completely free from clays, frozen sections, and foreign substances. It may consist of either natural or washed soil and must be free of organics. The sub base fill shall be a well graded mixture, shall have material not larger than 2 inches, and must comply with the following grain size gradation by weight:

Maximum passing No. 100 sieve: 35%.
Maximum passing No. 200 sieve: 25%.

This grading shall be determined in accordance with ASTM Standard Specification C117 and C136.

2.04 WEED KILLER

A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this work by governmental agencies having jurisdiction.

2.05 TOPSOIL

A. Where and if shown on the drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones, noxious weeds, sticks, brush, litter, and other deleterious matter.

B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources. Stockpiled topsoil may be used, provided it meets the requirements of these specifications. Additional topsoil from certified off-site sources shall be used, provided it meets the requirements of these specifications. Topsoil for lawn and planting operations shall be fertile, friable, natural loam containing a liberal amount of humus. It shall be free of admixtures and subsoil and shall be reasonably free of noxious weed, seed, lumps, plants, or their roots, and completely free of stones, sticks, and other extraneous matter, and shall not be used for planting operations while in a frozen or muddy condition. After spreading to a uniform depth of 6” minimum, all topsoil shall be raked to remove all extraneous matter. Raked topsoil shall conform to the mechanical analysis specified below and shall be free of stones, lumps, plants or their roots, sticks and similar debris, or any other undesirable material. Topsoil shall not be used in a muddy or frozen condition.

1. All topsoil to be furnished shall be subject to the approval of the Architect. Furnish a certified analysis, made by a recognized authority, of any topsoil that may have to be furnished to complete the work of this section. Test reports shall match the format listed below.

2. Topsoil shall have an acidity range of pH 5.0 to 7.0 and shall contain not less than 6 percent organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees centigrade. The mechanical analysis of the soil shall be as follows:

Passing	Retained On	Percentage
1" screen		100%
1" screen	¼" screen (gravel)	Not more than 3%
¼" screen	No. 100 USS mesh sieve (sand)	40%-60%
#100 USS	(Very fine sand, silt & clay)	40%-60%

3. Topsoil in which more than 60 percent of the material passing the USS No. 100 mesh sieve consists of clay as determined by the hydrometer or by the decantation method, shall not be used. All percentages are to be based on dry weight samples. The chemical and mechanical analysis shall state the above items in correct quantities.

4. The Architect reserves the right to take samples of the topsoil from time to time, whether delivered to or stored at the site. These samples will be analyzed for comparison with the Specifications. Should tests show that topsoil does not comply with the Specifications, the material may be rejected or such other remedy made as approved by the Architect in the form of the addition of humus or other supplemental materials.

5. The topsoil mixture materials shall be thoroughly mixed by hand or by rotary mixer to the satisfaction of the Architect.

2.06 OTHER MATERIALS

A. Provide other materials, not specifically described, but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation Classifications: The following classifications of excavation will be made when rock is encountered:

1. Earth Excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

2. Rock excavation for trenches and pits includes removal and disposal of materials and obstructions encountered that cannot be excavated with a track-mounted power excavator, equivalent to Caterpillar Model No. 215C LC, and rated at not less than 115 HP flywheel power and 32,000-pound drawbar pull and equipped with a short stick and a 42-inch wide, short tip radius rock bucket rated at 0.81 cubic yard (heaped) capacity.

3. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.

4. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or equivalent track-mounted loader, rated at not less than 210 HP flywheel power and developing minimum of 45,000 pound breakout force (measured in accordance with SAE J732).

   a. Typical materials classified as rock are boulders 1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
   b. Intermittent drilling, blasting, or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

5. Rock Excavation:

   a. In the event that rock is encountered and is of a type that cannot be broken up and excavated by machine or moved into deep fill areas, blast as necessary, and remove and dispose of same off site.

   b. Rock that can be broken up, excavated by machine, and/or moved into deep fill areas shall be reduced to a size not exceeding 6" prior to depositing in deep fill areas.

   c. Definition: Whenever the word "removal" is used in connection with rock, it is to be construed to mean "blasting, excavating, and the removal of rock that cannot be broken up by machine and removed", as defined previously.

      1) As this facility is in session daily Monday through Friday and its surrounding neighbors

are contiguous, the preferred methodology of excavation and removal of rock is to be construed as "passive" in nature--meaning "drilling or any other passive means". The excavation contractor shall coordinate his/her work with the Owner's representative so as to perform that work with the least disruption to the Owner and the Owner's neighbors and with maximum intent to the safety of same. The preferred time of rock removal work shall take place when the Owner's facilities are vacated, thereby meaning after the close of school each day or on weekends, as long as these times are permitted by all State and Local Ordinances and are acceptable and coordinated with the School and its neighbors.

d. Blasting shall conform strictly to all local and state laws, rules, and regulations applying thereto, and shall avoid excess noise and vibration. Steel mats shall be provided where necessary to prevent damage from flying fragments. Drill holes shall not be carried any further than necessary to remove the rock desired. The care, handling, and storing of explosives shall conform strictly to all local and state laws, rules, and regulations applying thereto. After concrete is set in place, no blasting shall be done except with the written permission of the Owner, and Architect.

e. The Contractor may consider the utilization of "Super Bristar 2000", a non-explosive demolition agent as a means of rock removal for this project.

f. General:

    1) Blasting shall be done as necessary for breaking rock for removal to depths, limits, and extent required for the construction of the building, site grading, and utility lines.

    2) Blasting shall be performed only by experienced, competent, licensed personnel under the direct supervision of an experienced, competent, licensed foreman.

g. Precautions:

    1) Blasting shall be permitted only when proper and adequate precautions have been taken for the protection of personnel, work, and property.

    2) Caps, fuses, and other exploders shall in no case be stored in the same place in which explosives are stored.

    3) All operations involving delivery, handling, storage, and the use of explosives shall be conducted in accordance with applicable laws, statutes, and regulations of the State, Municipal, or other governing bodies having jurisdiction. Likewise, the blasting contractor shall secure and pay for all necessary permits on behalf of the excavation contractor/contractor and shall provide same to the Owner, and Architect prior to scheduling the work. Open rock and rock in trenches shall be removed to a depth of 8" below required grades.

h. Do not perform rock excavation work until material to be excavated has been cross sectioned and classified by the Contractor's qualified independent geotechnical testing laboratory and associated soils engineer (employed and paid by the Contractor), and as approved by Architect/Engineer.

i. Rock payment lines are limited to the following:

    1) Three feet outside of concrete work for which forms are required, except footings.

    2) Two feet outside perimeter of footings.

3) In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than inside diameter of pipe, but not less than 3 feet minimum trench width.

4) Outside dimensions of concrete work where no forms are required.

5) To bottom of all footings which, as designed, are minimum 1'-8" below finished floor and are to bear on undisturbed rock of 8 T.S.F. bearing capacity minimum. This capacity to be verified by Contractor's geotechnical testing laboratory and associated soils engineer.

6) Under slabs on grade, 6 inches below bottom of concrete slab.

7) Work indicated herein under these rock payment lines is part of this Contractor's base bid.

3.02 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. The Contractor shall safely support and maintain adjacent and abutting property and structures and shall maintain the work safe to life, limb, and property.

C. Barriers, sheet piling, bracing, and the like shall be installed where required to maintain the excavation and the banks in a safe and stable condition.

D. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

E. Slope sides of excavations to 1:1 or flatter or to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

F. Shoring and bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

G. All temporary sheet piling, bracing, shoring, and other protective work shall be removed after the necessity for same ceases to exist, in the opinion of the Architect, and before backfilling.

H. All work removed or damaged through the installation or removal of the temporary protective work or through improper protection work shall be replaced or repaired in an approved manner at no cost to the Owner.

I. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the work.

3.03 DEWATERING

A. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and

discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

B. Surrounding soil shall not be disturbed or removed during pumping operations.

C. Water shall be disposed of by pumping to a point directed by the Architect without damage to adjacent property.

D. The Contractor shall provide, operate, and maintain adequate equipment to keep the excavations free from water so that the excavating, concrete work, membrane waterproofing, and all other work in the excavations will be performed in the dry.

E. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

3.04 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

2. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.05 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

B. Contractor shall prepare building and sidewalk areas to underside of floor slab plus or minus 1/2". Under no circumstances shall any material other than approved on-site material, or specified imported controlled structural fill be used for filling within a depth of 10" inches below building and sidewalk slabs on grade or within a depth of 12" beneath all column or wall support footings. Imported controlled structural fill shall also be utilized in all areas supporting earthen or other load carrying structures where organic soil materials are encountered subsequent to the removal of said organic soil materials.

C. Excavations for footings and foundations: Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work. Piers, concrete slabs, and footings shall be benched a minimum of 2" into rock at sloping rock conditions as indicated on the drawings where no excavation is required.

D. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction, and for inspection. Do not disturb bottom of excavations intended for bearing surface.

E. Unsuitable Material: All unsuitable material below the grading plane shall be excavated and removed and the space filled with granular material as specified herein.

1. Unsuitable materials are those soils that exhibit characteristics that make them unsuitable for the direct support of the pavement structure, such as organic silt, elastic clays and silts, topsoil, frost susceptible soils, etc. Unsuitable materials shall be removed to the depth directed by the Soils Engineer and the Construction Manager when applicable.

2. The excavation and disposal of unidentified unsuitable material below the grading plane shall be paid on the basis of the Conditions of the Contract relative to Changes in the Work.

3. The granular fill material will be used in the fill sections within the paving area. No additional payment will be made for placing this material in the fill areas.

F. Unsuitable material will be legally disposed of off site.

3.06 EXCAVATION FOR PAVEMENTS, SLOPES, DITCHES, ETC.

A. The work under this item shall consist of the following in accordance with the plans, specifications, addenda, bid proposal, and requirements herein: excavating for pavement, slopes, ditches, and all other work incidental to the excavation for the pavement, including disposing of unsuitable and surplus material, preparing the subgrade, compaction, grading, slopes and shoulders, and all other work needed to complete the item.

B. Cut surface under pavements to comply with cross sections, elevations, and grades as indicated.

C. Drainage and Site Maintenance: During construction, the site shall be maintained in such condition that it will be adequately drained at all times.

D. Unsuitable Material: All unsuitable material below the grading plane shall be excavated and removed and the space filled with granular material as specified herein.

1. Unsuitable materials are those soils that exhibit characteristics that make them unsuitable for the direct support of the pavement structure, such as organic silt, elastic clays and silts, topsoil, frost susceptible soils, etc. Unsuitable materials shall be removed to the depth directed by the Soils Engineer and the Construction Manager when applicable.

2. The excavation and disposal of unidentified unsuitable material below the grading plane shall be paid on the basis of the Conditions of the Contract relative to Changes in the Work.

3. The granular fill material will be used in the fill sections within the paving area. No additional payment will be made for placing this material in the fill areas.

E. Unsuitable material will be legally disposed of off site.

F. The Contractor shall store topsoil, embankment soils, and other materials, and/or to excavate beyond the limits of the contract and slope easements. The cost of stockpiling and rehandling shall be included in his base bid price.

G. All soils that are classed as suitable for the direct support of the pavement (non-organic and non-frost susceptible soils) shall be scarified to a loose depth of ten (10) inches and recompacted to 95% of the maximum density at the optimum moisture content of the soils determined by ASTM D-1557. The moisture content at the time of compaction shall not be greater than one (1) percent nor less than two (2) percent by weight of dry soil of the optimum moisture content. Dry soils shall be moistened and thoroughly mixed to the required moisture content. Wet soils shall be dried by aerating the required moisture content.

1. The cost of adding moisture, drying, and compaction shall be included in the Contractor's base

bid price.

H. Subgrade in excavated areas for new pavement shall be compacted to the density specified below. Soils not conforming to this density shall be scarified or loosened to a depth of ten (10) inches, water added in the amount necessary, and the material recompacted to provide the required density.

1. Compaction control will be provided as follows: The subgrade in excavated areas shall be compacted to at least ninety-five (95) percent of the maximum density as determined by the "Test for Moisture Density Relations of Soils using a 10 lb. Rammer and 18 inch Drop", ASTM D-1557 as currently revised. Samples of subgrade materials for testing purposed shall be taken at frequent intervals daily. From these tests, corrections and changes in moisture content will be made and compaction continued until required densities are achieved.

I. The Contractor shall check the work under this Item with templates, slope boards, or other devices satisfactory to the Soils Engineer. The completed work shall conform to the plans within the following tolerances.

J. For pavement subgrade, the surface shall vary no more than three-quarter (¾) inch from a ten (10) foot straight edge applied to the surface, and the actual grade of the subgrade shall not vary more than one (1) inch from plan elevation.

3.07 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Excavate trenches to uniform width, sufficient wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both side of pipe or conduit.

B. Accurately cut trenches for pipe or conduit that is to be installed to designed elevations and grades to line and grade from 4" below bottom of pipe and to width as specified. Place 4" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 6" layers measured loose to the top of the trench.

C. Excavate trenches and conduit to a depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost lines.

1. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel prior to installation of pipe.

2. For pipes or conduit less than 6" in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90° (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensuring continuous bearing of pipe barrel on bearing surface.

4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects.

5. When the void is below the sub-grade for the utility bedding, use suitable earth materials and compact to the relative density of 95 percent (in accordance with ASTM D698).

6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated to a relative density of 92 percent (in accordance with ASTM D1557).

7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.

D. The local utility companies shall be contacted before excavation shall begin. Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous uniform bedding.

E. All trench excavation side walls greater than 5 feet in depth shall be sloped, shored, sheeted, braced, or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches 4 feet or deeper.

F. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.

G. Trench width requirements below the top of the pipe shall not be less than 12" nor more than 18" wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit, or cable shall be at least practical width that will allow for proper compaction of trench backfill.

H. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:

1. Water mains: 50" to top of pipe barrel.

2. Sanitary Sewer: Elevations and grades as indicated on drawings (48" minimum cover).

3. Storm Sewer: Depths, elevations, and grades as shown on drawings.

4. Electrical Conduits: 30" minimum to top of conduit or as required by NEC 300-5, NEC 710-36 codes, or the local utility company requirements, whichever is deeper.

5. TV Conduits: 18" minimum to top of conduit or as required by the local utility company, whichever is deeper.

6. Telephone Conduits: 30" minimum to top of conduit, or as required by the local utility company, whichever is deeper.

7. Gas Mains and Service: 30" minimum to top of pipe, or as required by the local utility company, whichever is deeper.

8. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.

9. Where the minimum cover is not provided, encase the pipes in concrete as indicated. Provide concrete with a minimum 28-day compressive strength of 2,500 psi.

I. Excavating for Appurtenances:

1. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.

2. Over-depth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete at no additional cost to the Owner.

3. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.

3.08 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.

3.09 BACKFILL AND FILL

A. All excavations shall be backfilled as promptly as the work permits but not before concrete has attained its full design strength and not until completion of the following:

1. Acceptance of construction below finish grade, including, where applicable, damp-proofing and water-proofing.

2. Inspecting, testing, approving, and recording locations of underground utilities.

3. Removing concrete formwork.

4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.

5. Removing trash and debris within excavated areas.

6. Placement of horizontal bracing on horizontally supported walls.

B. No frozen material shall be used. Backfill shall be placed in uniform horizontal layers of approximately 8" in depth. Each layer shall be moistened during compaction. Compaction shall be done in a manner approved by the Architect and shall be continued until fill is solid and no settlement will occur.

C. When sheeting, shoring, and bracing is removed, all voids shall be filled with sound materials and thoroughly tamped.

D. Backfill operations shall be made to the new surface grades as shown on the drawings.

E. No backfill shall be placed covering other work until after such work has been inspected and approved. Any backfilling placed on earth that has caved in and covered other work before same has been inspected and approved shall be removed when so directed.

F. Excess material, if any, and all rubbish shall be removed from the site or otherwise disposed of as may be directed by the Architect.

G. General: Place soil material in layers to required subgrade elevations, for each area classification

listed below, using materials specified herein.

1. Under grassed areas, use satisfactory excavated or borrow material.

2. Under walk sand pavements, use subbase material.

3. Under steps, use subbase material.

4. Under foundations, use controlled structural fill material.

5. Under building slabs, use granular material or on site sub grade material if determined acceptable by the Architect or Soils Engineer.

6. Under piping, conduit, and equipment, use subbase materials where required over rock bearing surface unless otherwise indicated. Shape excavation bottom to fit bottom 90° of cylinder.

3.10 CONTROLLED STRUCTURAL FILL OR MATERIAL

A. Location: Imported controlled structural fill shall be used when necessary to provide proper soil bearing capacity:

1. Under all proposed buildings and sidewalks and at least 5 feet beyond the limits of the proposed buildings to a depth as required by foundation design where sidewalks are not part of the scope of building work.

2. Under all footings (continuous or spread) to a depth of at least 12 inches, or as required by foundation design.

3. For all load carrying structures which are situated in areas of soft organic soil deposits subsequent to the removal of said soft organic soil deposits.

4. Sand shall be used as bedding for all drainage and sewerage utilities, unless groundwater problems are encountered or anticipated that may require the use of crushed stone.

3.11 SUB BASE FILL OR MATERIAL

A. Location: The subbase fill may be used in all fill areas where controlled structural fills specified for buildings are not required due to soil conditions, as long as the requirements listed in Section 2.03A are met. Under no circumstances shall subbase material be in directed contact with structural support component, or in support of any of the proposed utilities.

B. Backfill trenches with concrete where trench excavations pass with 18" of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

1. Concrete is specified in Division 03.

2. Do not backfill trenches until test and inspections have been made and backfilling is authorized by Contracting Officer. Use care in backfilling to avoid damage or displacement of pipe systems.

C. Provide 4" thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing of piping or conduit, provide minimum 4" thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

D. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection testing, approval, and recording locations of underground utilities have been performed and recorded.

3. Removal of concrete formwork.

4. Removal of shoring and bracing and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities or leave in place if required.

5. Removal of trash and debris from excavation.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.12 PLACEMENT AND COMPACTION

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

B. Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers.

C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

D. Place backfill and fill materials evenly adjacent to structure, piping or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

F. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed if soil density test indicate inadequate compaction.

1. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density, in accordance with ASTM D 1557 (Modified Proctor):

a. Under footings, compact subgrade and subbase material to at least 95% maximum dry density.

b. Under structures, building slabs and steps, and pavements, compact top 12” of subgrade and each layer of backfill or fill material to at least 95% maximum dry density.

c. Under lawn or unpaved areas, compact top 6" of subgrade and each layer of backfill or fill material to a MAXIMUM of 85% maximum dry density.

d. Under synthetic turf, compact top 6" of subgrade and each layer of backfill or fill material to at least 90% maximum dry density.

e. Under walkways, compact top 6" of subgrade and each layer of backfill or fill material to at least 95% maximum dry density.

G. Moisture Control:

1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface during or subsequent to compacting operations.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests.

3.13 FILLING AND BACKFILLING

A. Filling and backfilling work shall include, but is not limited to, the following:

1. Contractor shall place and compact bank-run sand and gravel from approved imported sources consisting of clean bank-run gravel or sandy gravel, free from organic material, loam, wood, trash, snow, ice, and other objectionable material, well graded within the following limits:

Maximum retained on 3/4" sieve:	30%.
Maximum retained on No. 4 sieve:	50%.
Maximum passing 100 sieve:	25-30%.
Maximum passing 200 sieve:	5%.

No material larger than 2-1/2" to 4" sieve size by weight. When available, on-site material may be used in place of imported controlled structural fill with the Soils Engineer's approval.

2. Compaction of bank-run gravel under footings, foundation, under slabs on grade, and in building areas shall be to 95% of maximum density in accordance with ASTM Test Designation D1557.

3. Granular material where required under footings and foundations shall conform to material and gradations previously specified and shall be determined in accordance with ASTM Standard Specifications C117 and C136.

4. Filling--Imported Controlled Structural Fill: Compaction of the controlled imported structural fill shall be performed at a moisture content 3% drier than optimum as determined in the lab. It shall be placed in uniform layers not exceeding 10 and/or 12 inches thick after compaction. Each lift shall be compacted to not less than 95% of the maximum dry density determined within the lab as modified proctor density and shall be monitored by the soils engineer using the applicable ASTM standard for testing. Each lift shall have a minimum of 2 feet density test per 500 square yards, one located in the area of the propose column and the second located

under a continuous wall footing. More frequent testing may be required at the discretion of the Soils Engineer based on the extent of filling on any given day or should any area become suspect.

5. Filling--Subbase Fill: Compaction of all subbase fill, either imported or on-site, shall be compacted at a moisture content 1-1.5% drier than optimum as determined in the lab. The subbase fill shall be placed in uniform layers not exceeding 8 inches in depth when uncompacted. Each lift shall be compacted to not less than 95% of its maximum dry density determined in the lab as modified standard for testing. At least two field density test shall be performed per lift within the area being filled on any given day beneath buildings provided the lift areas do not exceed 500 square yards.

3.14 TRENCH BACKFILLING

A. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact, as specified, to properly correct condition in an acceptable manner.

B. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in 8" maximum loose lifts. Compact to minimum density of 95 percent of optimum density in accordance with ASTM D698 (or 92 percent of optimum density in accordance with ASTM D1557).

C. Compaction: Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.

D. Compaction Testing: Independent testing laboratory shall perform test at intervals not exceeding 200'-0" of trench for the first and every other 8" lift of compacted trench backfill and furnish copies of test results as specified.

3.15 MATERIALS FOR FILL UNDER CONCRETE SLABS ON GRADE

A. Contractor is to establish building pad at underside of floor slab, plus or minus 1/2".

B. Prior to placing fill fine grading materials on building pad, existing pad fill shall be leveled and recompacted.

C. Fill materials under concrete slabs on-grade in building areas, under sidewalks, pads, concrete aprons, etc., are to be the sieve analysis previously shown for controlled structural fill.

D. Compaction of fill shall be as previously set forth. When compacting fill with mechanical compactor against foundation walls, pits, loading dock, etc., Contractor shall provide complete protection against damage to said installations.

E. There is to be a layer of no less than 6" of clean suitable bank run sand fill below all slabs on grade. On site material may be acceptable and its usability is to be verified via soils reports. The Contractor’s bid is to be based on the use of on site material for use under slabs unless indicated otherwise within the Construction Documents.

F. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum, quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction

to specified density.

2. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.16 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade, and cross section, with finish surface not more than 1/2" above or below required subgrade elevation.

3. Shape the surface or areas scheduled to be under pavement to line, grade, and cross section, with finished surface not more than 0.05 feet above or below the required subgrade elevation.

C. Grading Surface or Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10-foot straight edge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.17 PAVEMENT SUB BASE COURSE

A. General: Subbase course consist of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

1. Refer to other Division 32 sections for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with the compaction and rolling of each layer of subbase course.

D. Placing: Place sub base course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

1. When a compacted subbase course is indicated to be 6" thick or less, place material in a single layer. When indicated to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.18 FOOTING AND BUILDING SLAB SUB BASE COURSE

A. General: Subbase course consists of placement of subbase material, in layers of indicated thickness, over subgrade surface and/or granular fill to support concrete building slabs as indicated on drawings.

B. Placing: Place material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

1. When a compacted subbase course is indicated to be 6" thick or less, place material in a single layer. When indicated to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.19 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service and the Construction Manager (when applicable) to inspect and approve each subgrade and fill layer before further backfill and construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ATM D 2167 (rubber balloon method), as applicable.

2. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gauges in accordance with ASTM D3017.

    a. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gauges at beginning of work, on each different type of material encountered, and at intervals as directed by the Contracting Officer.

3. Footing Subgrade: Per each stratum of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested stratum when acceptable to the Construction Manager (if applicable) and the Architect.

4. Paved Areas and Building Slab Subgrade: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.

5. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.

6. If it is determined by the Construction Manager (if applicable), the Architect, the Owner, and/or Independent geotechnical testing laboratory and associated soils engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.20 EROSION CONTROL

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction or if the project is of sufficient size to require one, refer to the Storm Water Prevention and Protection Plan included elsewhere herein.

3.21 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 CERTIFICATION

A. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Architect a written report from a soil engineer certifying that the compaction requirements have been obtained and the type or classification of fill material placed.

3.23 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. All rubbish and other excavated material, which in the opinion of the Architect is not suitable for fill or grading, shall be removed and legally disposed of away from the premises.

B. Approved excavated material shall be spread on the site in locations as directed by the Architect.

C. Excavated material in excess of that required for all filling, backfilling, and rough grading shall become the property of the Contractor and shall be removed from the premises and legally disposed of.

D. Removal from the School's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off the School's property.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 310001 – SITE WORK GENERAL PROVISIONS

PART 1 - GENERAL

1.01 GENERAL:

A. Applicable provisions of the “Conditions of the Contract” shall govern the work of this section and under Division 31, 32 & 33.

1.02 SCOPE/SUMMARY:

A. The Drawings and Specifications are intended to provide for a complete and ready for operation installation. However, both the Drawings and Specifications are for the Contractor's guidance and are not intended to give every detail of the existing conditions or new installations nor do they describe every fitting required for the installation of the work. The Contractor shall furnish, install, and place in workmanlike manner all equipment, accessories, supports, fittings, and all other material needed for the complete installation.

B. Before submitting his proposal, the Contractor shall be fully informed to the extent, character and intent of the work to be done by him. No consideration will be granted for any misunderstanding of the material to be furnished or work to be performed.

C. The site work scope shall include providing all plant facilities, labor, materials, tools, equipment, appliances and supervision necessary or incidental to complete site work, including, but not limited to, the following:

1. Surveying and layout work
2. Preliminary work
3. Demolition
4. Clearing and grubbing
5. Striping and stockpiling existing topsoil
6. Protection
7. Removal and disposal
8. Rough grading, excavating, filling, backfilling and dewatering
9. Excavating, trenching, and backfilling for utility systems including gas, water, electric, telephone, storm and sanitary lines.
10. Sediment and erosion control procedures as may be required.
11. Storm water drainage systems, catch basins and manholes
12. Site improvements, including but not limited to, fencing, curbing, striping, signage, guardrails, paving, lighting, retaining walls and miscellaneous related work.
13. Landscape work
14. Finish grading and paving
15. Site work water mains, electric and gas services
16. Sanitary sewer systems, including manholes and exterior grease traps
17. Concrete work in connection with site preparation and development

D. Perform all work in accordance with all applicable local, state, and federal codes, laws, and ordinances.

E. Sediment and erosion control procedures shall be performed as required and in conformance with Specification Section 312500; and for LEED Certified projects, in accordance with the requirements of LEED SS Prerequisite 1

F. If the project is of a size and scope that requires a Storm Water Pollution Prevention Plan (SWPPP) refer to additional documentation provided elsewhere herein and conform to its requirements in conjunction with and as related to this section.

1.03 GENERAL PROVISIONS:

A. Verifying Existing Conditions:

1. The Contractor, before submitting his bid, shall examine the site to which this work is in any way dependent upon according to the intent of these Specifications and accompanying Drawings. He shall report to the Architect, in writing, prior to his bid any conditions which prevent him from performing his work. No "Waiver of Responsibility" for inadequate, incomplete, or defective work will be considered by the Architect unless written notice has been filed by the Contractor.

a. Cooperation:

1) When a project involves construction on an existing occupied site, the work called for in this Specification and indicated on the accompanying Drawings shall be carried on in conjunction with the continued operation of the existing building and shall be so arranged that its installation and operation will conform with and facilitate the early installation of work.

2) The Contractor shall bear the expense required to revise his work due to any failure to coordinate the installation of his work with that of the building's operation.

3) The Contractor shall be responsible for the distribution and information concerning his work as required for the prompt installation and coordination with other trades.

b. Accessibility and Clearances:

1) The Contractor shall inform himself fully regarding peculiarities and limitations of space for the installation of the materials and equipment under Division 31, 32 & 33. He shall verify all dimensions and conditions in the field. No extra compensation will be allowed because of differences between actual dimensions and the sizes shown on the Drawings.

2) The Contractor shall see that equipment and apparatus necessary to be reached from time to time for operation and maintenance are made easily accessible.

3) Although the location of items may be shown on the Drawings in a specific place, the construction may disclose the fact that the location for this work does not make its position easily and quickly accessible. In such case, the Contractor shall call the Architect's attention to same before installing the work and shall be guided by the Architect's instruction.

1.04 PRELIMINARY WORK:

A. Before starting the work, make a thorough inspection of the work area to determine the physical condition of natural features and adjacent improvements to remain.

B. Provide complete mark out/tone out of existing utilities for coordination of proposed work. Repair any damage that occurs to existing utilities to remain at no additional cost to the owner.

C. Notify all authorities owning utility lines running to or on the property. Protect and maintain all utility lines that are to remain on the property and cap those that are not required in accordance with the

instructions of the utility companies or local authorities having jurisdiction over them.

PART 2 - PRODUCTS

This part not used.

PART 3 – EXECUTION

3.01 PROTECTION:

A. The Contractor shall effectively protect, at his expense, all materials and equipment, including his employees, during the period of construction, and he shall be held responsible for all damage done to his work, until the same is fully accepted by the Architect.

B. Provide protection necessary to prevent damage to existing building(s), concrete, pavement, utilities or vegetation indicated on the Contract Documents to remain. Box or otherwise protect from damage all trees, shrubs, lawns, etc. which are to be preserved. Trees shall be kept free from guy lines. Remove all protection when work is completed and when authorized to do so by the Architect.

C. Protect improvements on adjoining properties and on Owner's property.

D. Restore damaged improvements to original condition as acceptable to Architect and/or Owner.

E. Protect the property, adjoining properties, wetlands, etc. from damage by soil erosion by installing silt fences and hay bales or as indicated in the projects Storm Water Pollution Prevention Plan, if one is applicable.

F. Conduct site operations to ensure minimum interference with parking lots, roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct parking lots, streets, walks, or other occupied or used facilities without permission from the Owner and/or authorities having jurisdiction.

G. Provide traffic control as required, in accordance with the New York State Department of Transportation "Manual of Uniform Traffic Control Devices" and the local jurisdiction traffic safety requirements.

H. Streets, roadways, parking lots, etc. shall be thoroughly cleaned and/or swept on a daily basis.

3.02 CLEARING and GRUBBING:

A. Clear and grub in the areas of the proposed building, paved areas and/or site improvements in preparation for rough grading and new construction.

B. Completely remove all trees, shrubs, stumps, roots, vegetation, growth, paving, boulders, rocks, rubbish, and all other material interfering with the installation of new construction or not suitable for rough or finished grading, except trees or shrubs directed or indicated to remain.

C. Remove all roots 1" in diameter or larger. Remove all boulders and rocks larger than 3" in largest dimension.

D. Remove all topsoil, peat, and soils containing a high degree of organic matter. (Coordinate with Item 3.03 below)

E. Remove all soft clay soils and rubbish fills.

F. Excavation resulting from the removal of trees, roots, and the like shall be filled with suitable on-site material or imported fill as approved by the Architect/Engineer. Place fill material in horizontal layers not exceeding 8" loose depth, and thoroughly compacted per fill requirements.

3.03 STRIPPING and STOCKPILING EXISTING TOPSOIL:

A. Existing topsoil and sod on the site within area designated on the drawings shall be stripped to whatever depths encountered to prevent intermingling with underlying subsoil or other objectionable material. Cut heavy growths of grass from areas before stripping.

B. Free the topsoil of stones, roots, brush, rubbish, clay or other unsuitable materials/objects over 2” in diameter and remove the latter from the premises before stockpiling the topsoil.

C. Care shall be taken not to contaminate the topsoil with clay or other unsuitable materials and remove the latter from the premises before stockpiling the topsoil.

D. Stockpile topsoil in storage piles where indicated or permissible within site staging perimeter (coordinate with Architect and/or Construction Manager). Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Excess topsoil shall be removed from the site by the Contractor unless specifically noted otherwise on the drawings.

E. Refer to soil erosion and sediment control drawing, if included, for additional details.

3.04 DEMOLITION:

A. Existing structures (where indicated), concrete and paving on the site (where indicated), including all existing/discovered inactive cesspools, cisterns, wells, foundation materials shall be completely demolished and all debris removed from the site. Excavation resulting from the removal sub-surface structures, foundations/footings shall be filled with suitable on-site material or imported fill as approved by the Architect/Engineer. Place fill material in horizontal layers not exceeding 8" loose depth, and thoroughly compacted per fill requirements.

B. Remove existing above grade and below grade improvements and abandoned underground piping or conduit as shown on the drawings or necessary to permit construction and other work.

C. All work shall be executed in such a manner as not to endanger the safety of the workmen or the public. All barriers and precautionary measures shall be erected as required.

3.05 REMOVAL and DISPOSAL:

A. Dispose of all debris resulting from the work of this section. Haul off site and dispose of legally.

B. Do not burn rubbish, organic matter, etc. on the site.

C. Do not bury concrete, rock, stumps/roots, etc. on the site.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 310002 – STAKE OUT

PART 1 - GENERAL

1.01 SUMMARY

A. Provide all plants, labor, tools, appliances, equipment, materials, and services required for the work indicated on the drawings and specified for this section.

PART 2 - MATERIALS

2.01 PRODUCTS

A. Not applicable to this section.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall employ a competent registered (New York State) surveyor to lay out the work and to establish all points, lines, and grades necessary for the proper execution of the work. The surveyor shall contact the Owner's representative before laying out the work at the site in order to coordinate the proper alignment of the work.

B. The Contractor shall have his engineer or surveyor place a sufficient quantity of stakes so that the location of all items to be installed can be clearly determined. This portion shall also be coordinated with the Owner's representative before commencing work.

C. At the completion of the work, the Contractor must submit to the Owner's representative a signed certification of the accuracy of the vertical elevations and horizontal locations of the work in relation to the contract plans. This must take the form of "as-built" drawings (a transparency of the contract plans may be used) and shall bear the signature and registration number of a registered New York State surveyor hired by or in the employ of the Contractor. This will be strictly enforced so that the Owner may have an accurate record of the completed work.

D. Should any discrepancy be found between points, lines, or grades shown on the drawings and actual conditions found in the field, the Contractor shall immediately notify the Owner's representative of such discrepancy, and the Contractor will not proceed with the work affected thereby until he has received the necessary instructions from the Landscape Architect or his representative.

E. The Contractor shall carefully maintain any benchmarks, monuments, and other reference marks, and, if disturbed or destroyed, replace as directed. All markers, permanent stakes, and any other reference marks used in the layout shall be left in place as directed by the Owner's representative.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions in the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Under this Section, the Contractor shall clear, grub, demolish and remove all items as shown on the plans, and as encountered during work. The Contractor shall remove trees, shrubs, boulders, debris, waste material, pavements, footings, drainage utilities and other items as shown on plans or encountered during grading operations, and as directed by the Engineer including but not limited to the following:

1. Protecting existing trees and vegetation to remain**.**
2. Removing trees and other vegetation.
3. Stripping topsoil and disposing of excess or stockpiling surplus as noted on the drawings or directed by the Engineer.
4. Clearing and grubbing site of trees, shrubs, grass, and other vegetation, including stumps, roots, and debris.
    a. Fill depressions caused by cleaning and grubbing.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
    a. Arranging to Shut Off Utilities: By Contractor.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Legally disposing demolished and waste materials off Owner's property.

B. The Contractor shall furnish, install, maintain and remove temporary construction and sediment control fencing in accordance with Specification Section 312500.

C. The Contractor is required to inspect the site prior to bidding and shall accept it in its present condition and maintain the site during the construction period.

1.03 RELATED SECTIONS

A. Section 310000 – Earthwork

B. Section 310001 – Site Work General Provisions

C. Section 310002 – Stake Out

D. Section 312500 – Erosion and Sediment Controls

E. Section 312510 – Temporary Tree and Plant Protection

1.04 REGULATORY REQUIREMENTS

A. Herbicides: Comply with the rules and regulations of the Department of Environmental Conservation Title 6, Chapter 4 Quality Services, Parts 320 through 329.

B. Owner approval in writing is required prior to applying herbicides.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Tree Pruning Compound: Waterproof, antiseptic, elastic and free of kerosene, coal tar, creosote, and other substances harmful to plants.

B. Herbicides: A chemical or a combination of chemicals which, according to the manufacturer's label, will kill stumps and roots. Deliver herbicides to the site in original manufacturers containers indicating type and percentage of chemical, and application instructions.

PART 3 - EXECUTION

3.01 SUMMARY

A. Clearing and grubbing shall include removal of trees, shrubs, groundcover plantings and their complete root systems, in accordance with the plans, specifications and directions of the Engineer.

B. All materials removed under this section shall be properly and legally disposed of off site at the expense of the Contractor.

C. The Contractor shall keep the site clear of all refuse and rubbish that may accumulate from his operations, and shall maintain such places in a neat condition.

D. All debris or other material necessary to be disposed of shall be placed in dumpsters and shall not be dumped or placed within the limits of the site.

E. The Contractor shall remove and dispose of all items of work as required to complete all work in accordance with the plans, specifications and directions of the Engineer.

F. Keep staging area and material storage within the Limit of Work line unless otherwise approved by the Owner.

G. The Contractor shall restore all pavements, grass, fences and other items disturbed during construction to match existing conditions to the satisfaction of the Owner.

H. The Contractor is apprised that the construction site is located in a residential and commercial area and that vehicular and pedestrian traffic must be protected and controlled in and around the project site at all times.

I. The Contractor shall verify with each of the utility agencies owning or controlling any services or appurtenances which may be affected by the work sufficiently in advance of demolition to permit ample time to do so such work as they deem necessary. This notification must be made prior to

the commencement of demolition and removal of the appurtenances. The Contractor shall cooperate with local authorities and utility companies in protecting such services and appurtenances as may be exposed to hazard during the work.

J. All necessary permits required by the owner, utility companies, or other interested authorities shall be obtained by the Contractor before starting any work. These permits and the terms thereof shall be the sole responsibility of the Contractor who shall pay all fees and make all arrangements with the interested authorities. The Contractor shall furnish the Engineer with signed copies of the necessary permits.

3.02 PREPARATION

A. Protection:

1. Prevent damage to buildings, pavement, pipes, conduits, poles and other structures above and below ground that are adjoining or included in the contract area. Repair damage resulting from the contractor's negligence.

2. Clearly mark out limit of removals for review by the Engineer.

3. Protect existing trees and shrubs not to be removed. Cut back to point of branching all broken branches and skinned areas. Treat exposed wood with tree pruning compound.

4. Store materials and equipment in cleared areas away from tree roots. Prevent employees and equipment from trampling over woodland, existing planting, and established lawns.

3.03 REMOVALS

A. Remove all living or dead tree and shrub growth where indicated or specified.

B. Top and limb all trees before felling, unless otherwise approved by the Engineer.

C. Cut all stumps 6 inches above ground. Apply a herbicide to the stumps and root area in accordance with the manufacturer's application instructions. Mix a red or yellow dye with the herbicide for identification purposes.

D. Chip out stumps to a depth of not less than 6 inches below finished grade. Backfill stump holes with topsoil.

3.04 PRUNING

A. Prune trees where indicated of undesirable wood with the resulting crown shaped to the natural habit of the tree. Remove all diseased and dead branches, and branches interfering with healthy growth. Scar trace bark wounds as directed. All cuts shall be cleanly made with sharp tools, flush with the parent trunk or limb. Paint cuts over 3 inches in diameter with tree pruning compound.

3.05 CLEAN UP

A. Remove and dispose of all logs, tree trimmings, and debris from the property. Leave Work area in a neat uncluttered condition.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 312317 – TRENCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions in the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:

1. Excavating trenches for utilities and utility structures.
2. Bedding.
3. Backfilling and compacting to subgrade elevations.
4. Sheeting and Shoring.
5. Dewatering.
6. Compacting backfill material.

B. Related Sections include the following:

1. Section 310000 – Earthwork
2. Section 312500 – Erosion and Sediment Controls
3. Section 312318 – Rock Removal
4. Section 331000 – Water Systems
5. Section 333000 – Sanitary Sewerage
6. Section 334000 – Storm Drainage Utilities

1.03 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand- Cone Method.
3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.04 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

B. Utility Structures: Manholes, catch basins, inlets, valve vaults, hand holes, and other utility access structures as indicated on Drawings.

C. Trench Terminology:

1. Foundation: Area under bottom of trench supporting bedding.
2. Bedding: Fill placed under utility pipe.
3. Haunching: Fill placed from bedding to center line of pipe.
4. Initial Backfill: Fill place from center line to 6 to 12 inches above top of pipe.
5. Final Backfill: Fill placed from initial backfill to subgrade.

1.05 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New York.

C. Dewatering Plan if required: Describe methods of dewatering and disposal of water.

D. Product Data: Submit data for geotextile fabric indicating fabric and construction.

E. Samples: Submit to testing laboratory, in air-tight containers, 10-pound sample of each type of fill.

F. Materials Source: Submit name of imported fill material suppliers.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with Section 014523 – Tests, Inspections and Special Inspections.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 COORDINATION

A. Section 013000 – Special Procedures and Provisions: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

A. Subsoil Fill: Clean natural soil with a plasticity index of 15 or less that is free of clay, rock, or gravel

lumps larger than 2 inches in any dimension; debris; waste; frozen material; and any other deleterious material that might cause settlement. Suitable material excavated from the site may be used as subsoil fill under optimum moisture conditions.

B. Granular Fill: Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil Classification of SW, SP, SP-SM or SP-SC.

C. Foundation Stone: Clean course aggregate Gradation No. 57.

D. Bedding and Haunching Material.

1. Rigid Pipe: Granular Fill.
2. Flexible Pipe: Foundation Stone.

E. Bedding for Structures: Foundation Stone.

F. Initial Backfill to 6 inches Minimum Above Utility:

1. Rigid Pipe: Subsoil Fill.
2. Flexible Pipe: Foundation Stone.

G. Final Backfill to Subgrade:

1. Under Pavement: Granular Fill.
2. Under Landscape: Subsoil Fill.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-woven, non-biodegradable.

B. Concrete: Concrete conforming to Section 033000 – Cast-In-place Concrete Work.

1. Compressive strength of 3,000 psi at 28 days.
2. Air entrained.
3. Water cement ratio of 0.488 with rounded aggregate and 0.532 with angular aggregate.
4. Maximum slump of 3.5 inches for vibrated concrete and 4 inches for non-vibrated concrete.
5. Minimum cement content of 564 lbs per cubic yard for vibrated and 602 lbs. per cubic yard for non-vibrated concrete.

PART 3 - EXECUTION

3.01 PREPARATION

A. Call local utility line information service indicated on Drawings not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating

equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.02 LINES AND GRADES

A. Excavate to lines and grades indicated on Drawings.

1. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.03 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume. Remove larger material as specified in Section 31 23 18.

C. Perform excavation within 48 inches of existing utility service in accordance with utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Remove water or materials that interfere with Work.

F. Trench Width: Excavate bottom of trenches maximum 16 inches wider than outside diameter of pipe or as indicated on Drawings.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Maintain vertical faces to an elevation equal to 12 inches above top of pipe.

1. When Project conditions permit, side walls may be sloped or benched above this elevation.
2. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this Section.

I. Support Utilities and Structures:

1. Keep trench width at top of trench to practical minimum to protect adjacent or crossing utility lines
2. Support utilities crossing trench by means acceptable to utility company.
3. Do not interfere with 45-degree bearing splay of foundations.
4. Provide temporary support for structures above and below ground.

J. When subsurface materials at bottom of trench are loose or soft, excavate to firm subgrade or to depth directed by Engineer.

1. Cut out soft areas of subgrade not capable of compaction in place.
2. Backfill with foundation stone and compact to density equal to or greater than requirements for subsequent backfill material.

K. Trim Excavation: Hand trim for bell and spigot pipe joints where required. Remove loose matter.

L. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

M. Place geotextile fabric over trench foundation stone prior to placing subsequent bedding materials.

3.04 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures, and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work unless approved by Engineer.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water, or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.05 SURFACE WATER CONTROL

A. Control and remove unanticipated water seepage into excavation.

B. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Section 312500 – Erosion and Sediment Controls.

C. Divert surface water and seepage water within excavation areas into sumps or settling basins prior to pumping water into drainage channels and storm drains.

3.06 DEWATERING

A. Design and provide dewatering system to permit Work to be completed on dry and stable subgrade.

B. Operate dewatering system continuously until backfill is minimum 2 feet above normal ground water table elevation.

C. When dewatering system cannot control water within excavation, notify Engineer and stop excavation work.

1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

D. Modify dewatering systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

E. Discharge ground water and seepage water within excavation areas through filter bags or into settling basins prior to pumping water into drainage channels and storm drains.

F. Remove dewatering and surface water control systems after dewatering operations are

discontinued.

3.07 BEDDING, HAUNCHING AND INITIAL BACKFILL

A. Place bedding full width of trench to the depth indicated on Drawings and compact to 95 percent maximum density. Excavate for pipe bells.

B. Install utility pipe and conduit in accordance with the respective utility section.

C. Support pipe uniformly along entire length of pipe.

D. Carefully place haunching material to center of pipe, rod and tamp material to fill voids and provide uniform support of pipe haunches. Compact to 90 percent maximum density.

E. Carefully place initial backfill to 6 inches above top of pipe or to depth indicated on Drawings. Compact to 95 percent maximum density.

3.08 FINAL BACKFILLING TO SUBGRADE

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact in accordance with schedule at end of this Section.

D. Employ placement method that does not disturb or damage utilities in trench or foundation perimeter drainage.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 50 feet of trench open at end of working day.

G. Protect open trench to prevent danger to the public.

3.09 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess material offsite and legally.

B. Furnish Engineer with certificate of disposal site or agreement from private property owner.

3.11 FIELD QUALITY CONTROL

A. Section 014523 – Tests, Inspections and Special Inspections: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D1557 or AASHTO T180.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

E. Frequency of Tests: Two tests per lift for every 1000 feet of trench.

3.12 PROTECTION OF FINISHED WORK

A. Section 017000 – Contract Closeout: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.13 SCHEDULE OF COMPACTION

A. Under Pavement and Slabs:

1. Granular Fill in maximum 8-inch loose lifts.
2. Compact to minimum 95 percent maximum density except the top 12 inches.
3. Compact top 12 inches to minimum 95 percent maximum density.

B. Under Landscape Areas:

1. Subsoil Fill in maximum 8-inch loose lifts.
2. Compact to minimum 90 percent maximum density.

C. In Unstable or Unsuitable Trench Foundation Areas:

1. Foundation Stone in maximum 12-inch loose lifts.
2. Compact to 98 percent maximum density.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 312318 – ROCK REMOVAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions in the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:

1. Removing identified and discovered rock during excavation.
2. Expansive tools to assist rock removal.
3. Explosive tools to assist rock removal.

B. Related Sections include the following:

1. Section 310000 – Earthwork

1.03 REFERENCES

A. National Fire Protection Association:

1. NFPA 495 - Explosive Materials Code.

1.04 DEFINITIONS

A. Rock: Solid mineral material with volume in excess of 1/3 cubic yard or solid material that cannot be removed with 3/4 cubic yard capacity excavator without drilling or blasting.

1.05 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Shop Drawings: Indicate proposed method of blasting, delay pattern, explosive types, and type of blasting mat or cover. Indicate intended rock removal method.

C. Survey Report: Submit survey report on conditions of buildings near locations of rock removal.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 495.

B. Seismic Survey Firm: Licensed company specializing in seismic surveys with five years documented experience.

C. Explosives Firm: Company specializing in explosives for disintegration of rock with five years documented experience.

1.07 PROJECT CONDITIONS FOR USE OF EXPLOSIVES

A. Conduct survey and document conditions of buildings near locations of rock removal prior to blasting; photograph existing conditions identifying existing irregularities.

B. Advise owners of adjacent buildings or structures, in writing, prior to executing seismographic survey. Explain planned blasting and seismic operations.

C. Obtain seismic survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties or other work.

1.08 SCHEDULING

A. Schedule Work to avoid disruption to occupied buildings nearby and conform to local laws and regulations pertaining to blasting times.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Conform to NFPA 495.

B. Explosives, Delay Devices, and Blast Mat Materials: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.

C. Mechanical Disintegration Compound: Grout mix of materials that expand on curing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 013000 – Special Procedures and Provisions: Coordination and project conditions.

B. Verify site conditions and note subsurface irregularities affecting Work of this Section.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.03 ROCK REMOVAL BY MECHANICAL METHOD

A. Excavate and remove rock by mechanical method.

1. Drill holes and use expansive tools, wedges, and mechanical disintegration compound to fracture rock.

B. Cut away rock at bottom of excavation to form level bearing.

C. Remove shaled layers to provide sound and unshattered base for footings and foundations.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 16 inches wider than pipe diameter.

E. Remove excavated materials from site.

F. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 310000 – Earthwork.

3.04 ROCK REMOVAL BY EXPLOSIVE METHODS

A. When rock is uncovered requiring explosives method for rock disintegration, notify Architect/Engineer prior to executing as follows.

1. Provide seismographic monitoring during progress of blasting operations.
2. Drill blasting holes within 12 feet of finished slope.
3. Disintegrate rock and remove from excavation.
4. Remove rock at excavation bottom to form level bearing.
5. Remove shaled layers to provide sound and unshattered base for footings and foundations.
6. In utility trenches, excavate to 6 inches below invert elevation of pipe and 16 inches wider than pipe diameter.
7. Remove excavated material from site.
8. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 310000 – Earthwork.

B. Notify affected parties 72 hours in advance of using explosives including:

1. Home owners.
2. Schools
3. Fire department.
4. Rescue.
5. Emergency management.
6. Local Law Enforcement department.
7. Department of Transportation.
8. Railroads

3.05 FIELD QUALITY CONTROL

A. Section 014523 – Tests, Inspections and Special Inspections: Field inspecting, testing, adjusting, and balancing.

B. Request visual inspection of foundation bearing surfaces by Architect/Engineer and inspection agency before installing subsequent work.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 312500 – EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. The Contractor, as a part of the site development, is responsible for the installation and maintenance of erosion and sedimentation control measures necessary to prevent the transportation of sediments to off-site areas. As such, he shall provide all labor, materials, equipment, tools and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures and site restoration measures as shown, specified and required to complete the Work. For projects that require a specific stormwater pollution prevention plan (SWPPP), see related information provided by others and incorporated within the contract documents.

2. Includes the installation, maintenance, adjustments, dismantling, removal and disposal of all soil erosion and sediment control measures required by the Project.*

3. Includes the disposal by the Contractor of all sediment and erosion control materials removed in legal fashion at an off-site location of the Contractor's choice.

4. Includes the control of dust by the application of water, or other means acceptable to the Architect/Engineer. *Use of Calcium Chloride is prohibited.*

* The specific methods and materials employed in the installation and maintenance of erosion control measures shall conform to the *New York State Stormwater Management Design Manual* and the *New York Standards and Specifications for Erosion and Sedimentation Control*.

B. For all Projects and for LEED Certified Projects: Soil and Erosion Control Measures must meet the requirements of LEED SS Prerequisite 1 by conforming to the Best Management Practices of the U.S. Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005 (September 1992), Storm Water Management for Construction Activities, Chapter 3, or local erosion and sedimentation controls standards and codes, whichever is more stringent. The SWPPP/environmental plan shall meet the following objectives:

1. Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protection of soil stockpiles, utilizing jute mesh or erosion control blanket material.

2. Prevent sedimentation of storm sewer or receiving streams.

3. Prevent polluting the air with dust and particulate matter.

C. Coordination:

1. The Contractor shall review requirements and procedures under other sections as specified in D below and coordinate with the Work that is related to this Section.

2. The Contractor shall comply with applicable NYSDEC regulations.

3. The Contractor shall comply with applicable NYCDEP regulations for protection of New York City lands.

4. The Contractor shall comply with Stormwater Pollution Prevention Plan Report, if one has been provided for this project.

5. If the project is of a size and scope that requires a stormwater pollution prevention plan (SWPPP), refer to additional documentation provided elsewhere herein, and conform to its requirements in conjunction with and as related to this Section.

D. Related Sections:

1. Section 015000 – Temporary Facilities and Controls
2. Section 013563 – LEED Requirements
3. Section 310000 – Earthwork
4. Section 310001 – Site Work General Provisions
5. Section 329200 – Turf and Grasses

1.02 APPLICABLE REGULATIONS

A. In the performance of the Contract, the Contractor and any Subcontractors shall comply with all applicable Federal, State, and local municipal laws and regulations concerning environmental protection and erosion and sediment control.

B. The Contractor shall comply with the following design standards and guidance documents:

1. *Construction Activity Erosion and Sediment Control Measures: "New York Standards and Specifications for Erosion Control", published by the Empire State Chapter of the Soil and Water Conservation Society. (The Blue Book).*

2. *Post-Construction Stormwater Control Practices, for water quality/quantity controls: "New York State Stormwater Management Design Manual", prepared by Center for Watershed Protection, for NYSDEC.*

3. *New York City Department of Environmental Protection, The Applicant's Guide to Stormwater Pollution Prevention Plans and Crossing, Piping or Diversion Permits, prepared by NYCDEP Bureau of water Supply Quality and Protection, Engineering and Operations Division, August 2002.*

4. *New York State Stormwater Management Design Manual.*

5. *New York State Dept. of Transportation (NYSDOT) Standard Specifications Construction & Materials, January 2, 1990 & Latest Editions & Addenda.*

The Contractor shall maintain a copy of each of these documents readily available for continuous reference thereto. The Contractor shall also keep a copy of Stormwater Pollution Prevention Plan, if one exists for this project, on site for continuous reference hereto.

C. The Contractor shall comply with NYSDEC SPDES General Permit No. GP-02-01 for Stormwater Discharges from construction activity.

1.03 SUBCONTRACTORS

A. Compliance with the provisions of this Section by Subcontractors shall be the responsibility of the Prime Contractor.

1.04 SUBMITTALS

A. **LEED Submittals: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements". (For LEED Certified Projects only)**

B. All submissions shall be made in accordance with the provisions of Section 013300.

C. Certification Statement – When a SWPPP is provided, all Contractors and Subcontractors shall submit a signed and sealed copy of the following certification statement on company letterhead before undertaking any construction activity at the site identified in the Stormwater Pollution Prevention Plan:

"I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan for the construction site identified in such Stormwater Pollution Prevention Plan as a condition of authorization to discharge stormwater. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards."

D. The certification must include the name and title of the person providing the signature in accordance with the General Permit; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date of the certification is made.

E. For projects without a SWPPP, prior to commencement of the Work, the Contractor shall submit to the Architect/Engineer, in writing, an Environmental Plan. The plan must be prepared by a NYS licensed Professional Engineer. The Environmental Plan shall describe proposed methods and schedules for environmental protection, restoration, and erosion and sediment control. At a minimum, the Environmental Plan elements must conform to the requirements and procedures shown and specified, and to the NYSDEC and NYCDEP regulations. It shall describe the Contractor's compliance with the requirements and procedures, as well as modifications or additions necessitated by specific site conditions or construction/restoration schedules.

1. As a minimum, the Contractor's Environmental Plan shall contain:

   a. The construction schedule including projected dates of clearing, construction, and restoration.

   b. A description of the sequence of operation and environmental precautions to be employed during construction of the site improvements.

   c. Erosion control measures to be implemented prior to completion of restoration.

   d. A drawing or series of drawings indicating width of the temporary work limits, extent of clearing and grubbing, location of stockpile and storage areas, location of hay bales and other erosion control devices, and placement of dewatering settlement basins (if required by project scope).

   e. Location of any disposal areas for excess excavated fill, subject to the approval of the Architect/Engineer. Disposal of materials shall be at approved and licensed landfills.

   f. Procedures for the preservation of existing vegetation, where practical, and restoration including, where appropriate, stone stabilization of stream banks and beds, fertilizing, seeding, and mulching, and soil stabilization matting such as jute netting.

F. The Contractor shall revise and resubmit the Plan until it is approved by the Architect/Engineer.

G. Material Submittals: Provide detailed material submittals, and as available, technical manufacturer's product data, for all items listed under 2.01 below.

PART 2 - MATERIALS

2.01 GENERAL

A. Vegetated surface restoration products shall conform to the applicable requirements of Sections 329200 and 329300.

B. Soil Erosion and Sediment Control Materials:

1. **Silt fence** shall conform to NYSDOT Section 209-2.08 ("Soil Erosion & Sediment Control-Silt Fence") requirements. A silt fence assembly shall consist of silt fence geotextile fabric, jute mesh, burlap fabric, excelsior blankets, setting posts, and fasteners and may include mesh support/plastic netting consistent with the NYSDOT Standard. Note: Geotextile fabric, unless otherwise noted, shall meet the requirements of NYSDOT 207-2 Materials, Geotextile Stabilization, Strength Class 1.

2. **Hay bales** shall be full size, unbroken and not rotted, and shall meet the requirements of NYDOT 209-2.04.

3. **Gravel bags** shall be fabricated from reinforced woven geotextile and shall include ties. No burlap bags shall be allowed. Coarse aggregate shall meet the gradation requirements of size designation #1 or #2 of table 703-4 from NYSDOT specifications and shall be used as the fill material. Each gravel bag shall be individually tied and double bagged. The bag with fill material shall be inversely inserted into the second bag in order to prevent leaking.

4. **Mulch** shall be straw or wood fiber mulch and shall meet the requirements of NYSDOT 209-2.01.

5. **Construction Entrances** shall consist of a geotextile fabric, crushed stone, RCA or gravel and if necessary, a drainage pipe to maintain ditch flow.

    a. Geotextile shall meet the requirements of NYSDOT 207-2 Materials, Geotextile Stabilization, Strength Class 1.

    b. Crushed Stone, RCA or Gravel shall be 150 mm of coarse aggregate material meeting the gradation requirements of size designation #3 on Table 703-4.

    c. The Contractor shall provide a drainage pipe sized with sufficient capacity to carry ditch flow.

    d. The construction entrance shall be maintained by the Contractor in a condition which will prevent tracking or flowing of sediment onto the right-of-way. All sediment spilled, dropped, washed, or tracked onto the right-of-way shall be removed immediately. In the event the entrance is no longer performing properly (i.e. the entrance aggregate becomes clogged with sediment), the contractor shall top-dress the entrance with additional coarse aggregate material.

C. Dust Control Materials: Water shall be potable and shall be obtained from an off-site source. Use of calcium chloride is prohibited.

D. Temporary water for truck washdown and dust control shall be provided by and be the complete responsibility of the General Contractor. Tire wash locations shall be as indicated on Construction Implementation Plans; where not indicated, on CIP, the General Contractor shall supply his proposed location(s) for washdown and written methodology.

E. Soil Stockpile Protection: Provide either 14 ga. geotextile silt fence fabric material, jute mesh, or soil erosion control blankets (similar or equal to R-1 Excelsior Series by Western Landscape and Geotextile Supply Corp., 5065 Colorado Boulevard, Denver, Colorado, 80216 - ph. (720) 941-3833.

PART 3 - EXECUTION

3.01 PROHIBITED CONSTRUCTION PROCEDURES

A. Prohibited construction procedures include, but are not limited to:

1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters, or at unspecified locations.

2. Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, or any surface waters.

3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors, or any wetlands.

4. Damaging vegetation adjacent to or outside of the access road or the right-of-way.

5. Disposal of trees, brush, and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.

6. Permanent or unspecified alternation of the flow line of the stream.

7. Open burning of project debris.

8. Applying any pesticides, including defoliants, desiccants, and plant regulators, in any wetlands containing significant stands of high vigor spartina alterniflora (saltmarsh cordgrass), zizania aquatica (wild rice), typhasp (cattail), and scirpus americanus (common threesquare).

9. Applying pesticides whose residues and metabolic products persist in the environment over extended periods of time.

10. Use of chemicals for dust control, including calcium chloride.

11. Use of asphaltic mulch binder.

3.02 EMERGENCY VEHICLE ACCESS

A. The Prime Contract(s) shall provide temporary access to all Fire, Police, Ambulance, Hospital, or other emergency vehicles, where his construction procedures or activities directly impact the access to the Owner’s facilities. Arrangements for temporary access shall be fully coordinated directly with the affected emergency department, the municipality which they serve and the Contractor.

3.03 CONSTRUCTION DETAILS

A. Verify existing conditions prior to start of work each day. This is an active site that is in constant ongoing use. Control of dust, erosion and sediment is of extreme importance.

B. Erect soil erosion and sediment control measures as shown on the plans, and at all locations of existing drainage along adjacent streets at all locations of existing on-site drainage, at newly installed drainage, along site driveways that are down-gradient from the items of work, and as directed by the Architect, Engineer and/or Construction Manager.

C. Implementation and maintenance shall be acceptable to the NYSDEC Division of Water.

D. Approved Silt Fence shall be erected at all locations where storm water flow will cause erosion. The more appropriate of manufacturer's instructions or plan details shall be followed in order that the installation perform in a satisfactory manner. Silt Fence shall only be removed after up-slope areas have been stabilized to avoid danger of washouts with deposition of soil and debris on adjacent areas.

E. Approved Hay Bales or gravel bags shall be installed around all existing drainage structure castings on site and along adjacent streets that may be impacted by the Work, or as directed by the Engineer. Hay Bales shall only be removed after up-slope and up-gradient areas draining to the line of Hay Bales have been stabilized to avoid danger of washouts with deposition of soil and debris on adjacent areas.

F. Approved Dust Control shall be performed on any day that dust from the work site may be blown into any portion of the project site or onto any portion of the surrounding roads and property adjacent to the work site. In the event that dust from the Contractor's operations becomes built-up off of the work site in any quantity, and at any location noted herein, the Contractor shall be required to take actions to correct this condition.

G. The Contractor shall install a Stabilized Construction Exit Pad (see detail and location on the plans, or in accordance with standard construction practice and as located on site via start of work. Location to be coordinated with the Owner's Representative. The Contractor shall be responsible for insuring that all vehicles exiting the site cross over the Exit Pad in an effort to prevent soil and other debris from the site from being deposited on off-site roadways. The Contractor shall be responsible for maintaining the efficiency of the Pad stone such that it accomplishes the task intended. In the event that crossing over the Exit Pad alone does not remove soil and debris from the vehicles, the Contractor shall provide equipment, personnel, etc., as needed, to wash the soil and debris from the vehicles using water.

3.04 SITE ACCESS AND CLEARING

A. Extent of Clearing and Grubbing: The Contractor shall confine all clearing and grubbing to that portion of the work limits absolutely essential for the construction and installation of the structures and appurtenances, particularly in the vicinity of stream corridors, surface waters, mature trees and steep slopes.

B. Schedule of Clearing: All clearing schedules shall be arranged to provide a minimum practical exposure (in both extent and duration) of soils in order to prevent erosion. As much of the ground cover root structure as is practical shall be left in place to minimize the length of right-of-way or work limit in which construction will be initiated within ten working days.

3.05 STOCKPILING OF MATERIAL

A. After vegetation has been removed, the Contractor shall strip any topsoil from the area to be excavated and stockpile it for future use. At the completion of the work, the Contractor shall legally

remove all excess fill from the site at his own cost.

B. When excavating trenches, the Contractor shall separate suitable backfill material from unsuitable material for use as backfill.

C. Items A & B above shall be done in conjunction with work conducted under 310000 - “Earthwork”.

D. Where topsoil or subgrade material is to be stored, a suitable means of protecting excavated material from wind and water erosion shall be employed. Erosion control methods may include one or more of the following: mulching, sprinkling, silt fencing, hay bales or erosion blankets.

3.06 PROTECTION OF TREES AND SHRUBS

A. The Contractor shall make very effort not to damage adjoining trees and shrubs, other than those he is permitted to cut, within or adjacent to the line of the excavation.

3.07 DEWATERING

A. Turbid water pumped from excavations or working or processing water containing oils or sediments shall be diverted to sediment traps shown in drawings prior to discharge. Extra caution shall be taken when discharge may be directed towards any surface water, stream corridor or wetland area.

3.08 EROSION CONTROL

A. The Contractor shall use necessary methods to minimize erosion within working limits and access roads. Methods of preventing erosion shall include the use of hay bales, silt fence, sediment traps, filter fabric, mulch, and jute or excelsior blankets, as conditions require. Erosion and sediment control methods shall be employed during site clearing, construction, immediately following clearing and backfilling and at the time of final restoration.

B. All erosion and sediment control practices shall be in place until construction is completed and/or the area is stabilized.

C. The Contractor shall provide special attention to areas where slopes are 15 percent or greater. In general, staked hay bales shall be used to minimize erosion on slopes. In steeper areas, staked hay bales and filter fabric shall be used downslope from construction. Jute netting or other means of protection shall be used on exposed slopes until vegetation or other permanent restoration measures are in place.

D. Minimum hay bales, silt fence, sediment traps installation requirements may be shown on the Drawings; if not shown, they shall be provided in accordance with design standards and standard construction practice.

3.09 NOISE CONTROL

A. Noise levels occurring during sediment and erosion control work shall not exceed limits specified by local and state regulations.

3.10 SEDIMENT & EROSION/SEDIMENTATION CONTROL

A. Erosion Control Measures shall include the following:

1. The proposed erosion control shown on the plans shall be installed prior to the start of construction. Additional erosion control may be necessary, based upon field conditions that may develop as construction progresses, and as may be required by the local conditions.

a. Existing vegetation to remain shall be protected and remain undisturbed.

b. Clearing and grading shall be scheduled so as to minimize the size of exposed areas and length of time that areas are exposed.

c. The length and steepness of cleared slopes shall be minimized to reduce runoff velocities and quantities.

d. Runoff shall be diverted away from clear slopes.

e. Sediment shall be trapped on-site.

Specific methods and materials employed in the installation and maintenance of erosion control measures shall conform to the *New York State Guidelines for Urban Erosion and Sedimentation Control*.

2. Sedimentation barriers (silt fence, hay bales, or approved equal) shall be installed prior to any grading work along the limits of disturbances and shall be maintained for the duration of the work. No sediment from the site shall be permitted to wash onto adjacent properties or roads. Where sedimentation barriers are required adjacent to streams, ponds or tidal areas, the silt fence is to be supported by a temporary metal post and chain link fence.

3. Graded and stripped areas and stockpiles shall be kept stabilized through the use of temporary seeding or sod as required.

4. Seed mixtures shall be in accordance with the Soil Conservation Service recommendations.

5. Soils stockpiled on individual lot as a result of excavation for foundations shall be placed to increase the distance these soils must travel to reach the drainage system.

6. Drainage inlets installed as part of the project shall be protected from sediment buildup through the use of sedimentation barriers, sediment traps, etc. as required.

7. Proper maintenance of erosion control measures is to be performed as indicated by the periodic inspection after a rainfall event totaling 0.5 inches of rainfall or greater or during a 14-day inspection program occurring throughout the period of the construction. Maintenance measures include, but are not limited to, cleaning of sediment basins or traps, cleaning and repair of berms and diversions and cleaning and repair of inlet protection.

8. Appropriate means shall be used to control dust during construction. A stabilized construction entrance shall be maintained to prevent soil and loose debris from being tracked onto local roads. In addition, a water source is to be maintained adjacent to this entrance for the purpose of washing debris from truck tires. The construction entrance shall be maintained until the site is permanently stabilized.

9. Sediment barriers and other erosion control measures shall remain in place until upland disturbed areas are permanently stabilized.

10. All 1:2 and 1:3 slope areas will be protected against erosion during construction and permanent ground cover shall be such that erosion will be prevented. Necessary measures shall include, but not be limited to, hay bales, silt fence, silt trap/basins, jute mesh, anchored straw mulch, hydroseeding, sod, etc. and shall be maintained for the duration of the construction as well as following the completion of construction until such time that the proposed plantings have become acclimated/established as determined by the authority having jurisdiction.

B. The plans shall also address the following environmental issues the Contractor shall be responsible

for addressing during construction:

1. Pollution prevention measures to be instituted to prevent litter, construction chemicals, and construction debris from becoming pollutant sources in storm water discharges from the site.

2. Provide a description of the method of storing waste materials on-site and a description of controls to be employed to reduce pollutants from these materials, including storage practices to minimize exposure of materials to storm water will a spill prevention and response plan.

3. The installation of a portable sanitary system or a system established in a field office trailer is to be maintained through the term of the project.

4. All soils stockpiled on the site for future use shall be covered to limit dust pollution and run-off of fines with rain.

5. Site clearing wood chips to be stockpiled for mulch shall be stockpiled in an area away from proposed construction and surrounded by silt fencing.

6. The Contractor shall be responsible for keeping adjacent roadways free of debris washed from the construction site. A street sweeper shall be employed to remove all soil and debris from roadways as often as may be required.

7. All construction debris shall be removed from the site within the same day, or kept in a manner to prevent it from leaving the site with storm runoff or blown from the site by winds.

8. All refuse shall be placed within a covered container for future disposal.

9. The Contractor shall be responsible for the disposal of all excess concrete dumped on the site. Furthermore, the Contractor shall designate a location for washing delivery trucks. This area is to be configured to insure that wash water does not runoff the site to either private property or public roadways. Subsequent to the completion of concrete activities, this area is to be excavated and material to be removed from the site. Suitable soils are to be brought to restore this area.

10. The Contractor shall be responsible for installing catch basin inserts into any and all County-owned catch basins connected to positive drainage systems, which are located adjacent to the project area or located within 100’ of the project area. It is the responsibility of the Contractor to maintain these inserts during the period of the construction in accordance with the manufacturer’s recommendation. At the end of all site work, including the development of individual sites, new media is to be installed and the devices are to be dedicated to the County. All structures are required to have an 80% Total Suspended Solids Removal or as may be specified in the New York State Design Manual. However, if it is determined that the catch basins lying within these limits do not connect to positive systems, and function solely as leaching basins, the Contractor will be responsible for cleaning each at the conclusion of all site work. This does not prevent the County from issuing a request to clean these facilities if it has been determined that the Contractor’s activities have adversely affected their normal function.

C. Sequence of Construction Activities:

1. Install silt fence, sediment traps, and hay bale filters as a part of initial phase of work to ensure maximum silt retention on site.

2. Mass grade the site, keeping disturbed areas to a minimum at all times. Seed and mulch sides of swales, mounds and ponds, immediately upon completion.

3. Control mud accumulation on all streets surrounding the project site by installing stone surface at each location where construction traffic leaves the site. Keep dust to a minimum, by utilizing sprinkling, vegetative cover, spray-on adhesives, or other approved methods.

4. Maintain all filters and traps during construction to prevent any blockages from accumulated sediment. Clean sediment traps, filters and fencing after each storm event as well as on a weekly basis. Replace all materials that are clogged or ineffective.

5. Remove temporary erosion control and sediment controls only when sufficient growth of ground cover is established to prevent further erosion.

D. Monitoring:

1. Monitor soil erosion practices at least weekly to determine the effectiveness of the installation and any repairs which may be required. Keep a detailed log of these observations and remedies taken.

2. Clean out siltation filters when siltation reduces capacity by 20 percent. Material removed may be dried and used as embankment material only, in areas approved by the Architect/Engineer.

3.11 DUST CONTROL

A. Dust control shall be achieved by wetting, sweeping, and temporary mulching. *The use of chemicals for dust control, including calcium chloride, will not be permitted.*

3.12 STABILIZATION

A. The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. This requirement does not apply in the following instances:

1. Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

2. Where construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures need not be initiated on that portion of the site.

3.13 MULCHING

A. Where slopes exceed 15 percent or as directed by the Architect/Engineer, mulch in the form of staked jute netting or other material approved by the Architect/Engineer must be installed and maintained until an adequate vegetative cover is established.

3.14 FILL MATERIALS

A. All fill materials shall be stockpiled away from wetland areas and water bodies and surrounded with an overlapping, anchored hay bale barrier.

3.15 SILT DISPOSAL

A. All silt that has accumulated behind hay bale barriers or silt fences shall be removed from the site after it has had sufficient time to dry, and before the hay bales or fences are removed.

3.16 INSPECTION REQUIREMENTS (FOR PROJECTS REQUIRING A SWPPP)

A. Soil erosion and sediment control shall be inspected by a Civil Engineering firm retained independently by the Owner specifically for soil erosion control inspection and all controls shall be maintained during the life of the project, including winter shutdown, etc. Such inspection and maintenance shall continue until after project is complete.

B. All inspections shall be completed within one calendar day. Inspection reports shall be issued within 5 working days from day of inspection. Within 3 calendar days after receipt of the inspection reports, the Contractor shall:

1. Repair or rebuild the control measures to function as originally intended.

2. Remove sediment deposition which reached one half the height of the control measure. All sediment deposits shall be considered unsuitable material and disposed of in accordance with NYSDOT Spec. 203-3.08, Disposal of Surplus Excavated Materials. Material shall be disposed of away from wetland, water courses or other bodies of water.

3. Torn or punctured silt fence fabric may be repaired by the placement of a patch, on the upstream side, consisting of an additional layer of fabric over the damaged area, or replacement of the damaged section.

C. Site inspections shall be conducted by a Civil Engineering firm retained by the Owner specifically for soil erosion control inspection at least every seven (7) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. During each inspection, the following information shall be recorded:

1. On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period.

2. Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization.

3. Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period.

4. Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of the sediment storage volume (for example, 10 percent, 20 percent, 50 percent).

5. Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water.

6. The Contractor shall correct all deficiencies that are identified with the implementation of the Stormwater Pollution Prevention Plan.

D. The Contractor shall maintain a record of all inspection reports in a site log book. The site log book shall be maintained on site and be made available to the permitting authority upon request. Prior to the commencement of construction, the Contractor shall certify in the site log book that the

Stormwater Pollution Prevention Plan meets all Federal, State and local erosion and sediment control requirements.

E. The Contractor shall post at the site, in a publicly-accessible location, a summary of the site inspection activities on a monthly basis.

3.17 SYSTEM MAINTENANCE (FOR PROJECTS THAT DO NOT REQUIRE A SWPPP)

A. The Contractor shall conduct regular and routine inspections of the installation and erosion control measures throughout the progression of the work, supplementing and restoring site conditions as necessary to maintain the site.

3.18 SYSTEM REMOVAL AND SITE RESTORATION

A. Restoration Area: All surfaces which have been disturbed or damaged by the Contractor's operations, including streambanks, slopes, dewatering, stockpiling, and equipment storage areas, shall be restored to the condition at least equal to that in which they were found immediately prior to the beginning of construction, or improved as indicated in the Contract Documents. Suitable materials and methods shall be used for such restoration. Grass shall be re-seeded with types compatible with particular areas involved and in conformance with Section 329200. The Contractor shall restore all damaged surfaces outside the work limits.

B. Restoration Schedule: Permanent restoration of vegetative cover shall be initiated only during optimal planting seasons as delineated in Section 329200. At other times, temporary restoration measures shall be implemented and followed by permanent restoration when the first optimal planting season occurs.

C. Restoration of vegetation shall be in conformance with Sections 329200 and 329300.

3.19 WINTER MAINTENANCE (FOR PROJECTS THAT REQUIRE A SWPPP)

A. See the following page for specific requirements.

END OF SECTION

STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION



Definition & Scope

A temporary site specific, enhanced erosion and sediment control plan to manage runoff and sediment at the site during construction activities in the winter months to protect off-site water resources.

Conditions Where Practice Applies

This standard applies to all construction activities involved with ongoing land disturbance and exposure between November 15th to the following April 1st.

Design Criteria

1. Prepare a snow management plan with adequate storage for snow and control of melt water, requiring cleared snow to be stored in a manner not affecting ongoing construction activities.

2. Enlarge and stabilize access points to provide for snow management and stockpiling. Snow management activities must not destroy or degrade installed erosion and sediment control practices.

3. A minimum 25 foot buffer shall be maintained from all perimeter controls such as silt fence. Mark silt fence with tall stakes that are visible above the snow pack.

4. Edges of disturbed areas that drain to a waterbody within 100 feet will have 2 rows of silt fence, 5 feet apart, installed on the contour.

5. Drainage structures must be kept open and free of snow and ice dams. All debris, ice dams, or debris from plowing operations, that restrict the flow of runoff and meltwater, shall be removed.

6. Sediment barriers must be installed at all appropriate perimeter and sensitive locations. Silt fence and other practices requiring earth disturbance must be installed before the ground freezes.

7. Soil stockpiles must be protected by the use of established vegetation, anchored straw mulch, rolled stabilization matting, or other durable covering. A barrier must be installed at least 15 feet from the toe of the stockpile to prevent soil migration and to capture loose soil.

8. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures should be initiated by the end of the next business day and completed within three (3) days. Rolled erosion control blankets must be used on all slopes 3 horizontal to 1 vertical or steeper.

9. If straw mulch alone is used for temporary stabilization, it shall be applied at double the standard rate of 2 tons per acre, making the application rate 4 tons per acre. Other manufactured mulches should be applied at double the manufacturer's recommended rate.

10. To ensure adequate stabilization of disturbed soil in advance of a melt event, areas of disturbed soil should be stabilized at the end of each work day unless:

    a. work will resume within 24 hours in the same area and no precipitation is forecast or;

    b. the work is in disturbed areas that collect and retain runoff, such as open utility trenches, foundation excavations, or water management areas.

11. Use stone paths to stabilize access perimeters of buildings under construction and areas where construction vehicle traffic is anticipated. Stone paths should be a minimum 10 feet in width but wider as necessary to accommodate equipment.

Maintenance

The site shall be inspected frequently to ensure that the erosion and sediment control plan is performing its winter stabilization function. If the site will not have earth disturbing activities ongoing during the "winter season", **all** bare exposed soil must be stabilized by established vegetation, straw or other acceptable mulch, matting, rock, or other approved material such as rolled erosion control products. Seeding of areas with mulch cover is preferred but seeding alone is not acceptable for proper stabilization.

Compliance inspections must be performed and reports filed properly in accordance with the SWPPP for all sites under a winter shutdown.

DIVISION 31 – EARTHWORK

SECTION 312510 – TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions in the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction, and the general protection and delineation of nearby wetlands.

B. Related Sections include the following:

1. Section 311000 – Site Clearing for removing existing trees and shrubs.

1.03 DEFINITIONS

A. Caliper: Diameter of a trunk measured by the average of the smallest and largest diameters at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

C. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

D. Wetland Protection Limits: Area in surrounding wetlands to be protected from impacts during construction and indicated on Drawings.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Existing Conditions: Documentation of existing trees, plantings, and wetlands indicated to remain and be protected, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.

1.05 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Erection of sheds or structures.
4. Impoundment of water.
5. Excavation or other digging unless otherwise indicated.
6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

7. Do not direct vehicle or equipment exhaust toward protection zones.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil

1. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of the following:

1. Type: Ground or shredded hardwood
2. Size Range: 3 inches maximum, ½ inch minimum
3. Color: Natural

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft; remaining flexible from minus 60 to plus 200 deg. F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.

a. Height: 4 feet
b. Color: High-visibility orange, nonfading

PART 3 - EXECUTION

3.01 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, listing conditions detrimental to tree and plant protection.

3.02 PREPARATION

A. Locate and clearly identify wetlands, trees, shrubs, and other vegetation to remain. Tie a 1-inch blue-vinyl tape around each tree trunk at roughly 54 inches above the ground, for all perimeter trees 4-inch caliper and larger, or as ordered by the Landscape Architect or Engineer. Flag the limits of all wetlands within 20 feet of the construction limits.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.03 WETLAND, TREE, AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of tree- and plant-protection zones, and a minimum of 1-foot outside of wetland-protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect, Owner, and Owners Representative. Under no circumstances will disturbance of wetlands be acceptable.

C. Maintain protection-zone fencing in good condition as acceptable to the Owner's Representative and remove when construction operations are complete, and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.

3.04 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 310000 – Earthwork.

3.05 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."
6. Root Pruning at Edge of Protection Zone: Prune roots 12 inches outside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

3.06 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
2. Do not apply pruning paint to wounds.

B. Chip removed branches and dispose of off-site.

3.07 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the tree- or plant-protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the tree- or plant-protection zone.

1. Minor Fill within Tree- or Plant-Protection Zone: Where existing grade is 5 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single un-compacted layer and hand grade to required finish elevations.

3.08 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect, Owner, and Owner's Representative. Under no circumstances will disturbance of wetlands be acceptable.

1. Submit details of proposed root cutting and tree and shrub repairs.

2. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect or Owner's Representative.

3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 320116 – COLD MILLING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Under this Section, the Contractor shall provide material, labor, and equipment necessary to mill, shape and remove existing bituminous pavements in accordance with the plans and specifications and directions of the Engineer.

B. The work shall consist of cold milling the existing pavement to the depths as noted on the plans. Cleaning of the pavement and tack costing prior to overlaying new pavement, shall also be part of the work.

C. All millings shall be removed from the work areas and become the property of the Contractor.

1.02 RELATED SECTIONS

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321723 – Pavement Markings
D. Section 321723.11 – Pavement Markings (Thermoplastic)
E. Section 321723.12 – Pavement Markings (Pre-formed Reflectorized)

1.03 SUBMITTALS FOR REVIEW

A. Submittals shall be in accordance with Section 013300.

B. Contractor shall furnish documentation and certification that the milling machine to be used is capable of removing the desired thickness of pavement.

PART 2 – PRODUCTS

2.01 MILLING MACHINE

A. Milling machines shall be power operated, self propelled machines capable of removing the desired thickness of existing pavement. The machine shall have sufficient power, traction and stability to accurately maintain depth of cut and slope.

B. Milling machines shall be capable of producing a finished profile and cross slope to within ¼” of that required and shall produce a uniform surface texture free from gouges and ridges greater than 3/8” in depth.

C. Milling machines shall have an integral loading system or sufficient equipment shall be provided to accomplish complete removal of milled material at a rate equivalent to the milling rate.

D. Vacuum trucks, street sweepers or power brooms shall be used to clean the milled surfaces. The machine shall be equipped with a means to control dust and other particle matter created by the cutting action.

E. All material removed during the milling process, including foreign debris within or on the pavement shall become the property of the Contractor and removed from the site and disposed of in a legal

matter at his/her expense.

PART 3 – EXECUTION

3.01 GENERAL

A. Profile and cross slope shall be controlled by a taut reference string line. The reference elevation and string line shall be established by the Contractor and subject to the approval on the Engineer.

B. The existing slope and pitch of the parking area shall be maintained.

C. Areas not accessible to the milling machine, such as around curbs or fences, may be removed with a small milling machine, handwork or other approved method.

D. Contractor shall remove, store, replace fence and fabric as required to operate milling equipment, where required.

E. All milled material, including that removed by other means, shall be immediately removed from the milled surfaces and adjacent surfaces.

F. Surfaces shall be cleaned of all fines and dust prior to the placement of tack coats, or pavement courses.

G. Milled surfaces to be overlaid shall receive a bituminous tack coat immediately prior to placement of overlay.

H. Damage to milled surfaces, such as raveling, fuel spillage or any contaminants, which would prohibit a good bond with new asphalt shall be repaired or re-milled by the Contractor in a manner approved by the Architect.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 320116.11 – MILLED IN-PLACE RECYCLED BASE COURSE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Under this Section, the Contractor shall construct a milled in-place recycled base course on various paths, roadways and parking lots, conforming to the lines, grades, thickness and cross slopes in accordance with the plans and specifications and directions of the Engineer.

B. The work shall consist of techniques used to pulverize to various depths (approximately 4-8 inches), and blend additional drybound aggregate (Item 4, RCA, etc.) in low areas, then recompacting the recycled base course.

1.02 RELATED SECTIONS

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321723 – Pavement Markings

1.03 SUBMITTALS FOR REVIEW

A. Submittals shall be in accordance with Section 013300.

B. Contractor shall furnish documentation and certification that the milling machine to be used is capable of removing the desired thickness of pavement.

PART 2 – PRODUCTS

2.01 MILLING MACHINE

A. Milling machines shall be power operated, self-propelled machines capable of removing the desired thickness of existing pavement. The machine shall have sufficient power, traction and stability to accurately maintain depth of cut and slope.

B. Milling machines shall be capable of producing a finished profile and cross slope to within 1/4” of that required and shall produce a uniform surface texture free from gouges and ridges greater than 3/8” in depth.

C. Milling machines shall have an integral loading system or sufficient equipment shall be provided to accomplish complete removal of milled material at a rate equivalent to the milling rate.

D. Vacuum trucks, street sweepers or power brooms shall be used to clean the milled surfaces. The machine shall be equipped with a means to control dust and other particle matter created by the cutting action.

E. All material removed during the milling process, including foreign debris within or on the pavement shall become the property of the Contractor and removed from the site and disposed of in a legal matter at his/her expense.

2.02 MATERIAL

A. Recycled base course shall consist of the existing asphalt pavement to and aggregate base which has been pulverized in place so that the maximum size of any material does not exceed 2 inches.

B. Virgin aggregates may be added, if deemed necessary by the Engineer, to change the gradation or raise the grade. The new material shall conform to Specification Section 321216.

C. All testing shall be performed by a laboratory of the Contractor's choice, approved by the Engineer.

D. A minimum of one sample per five thousand square feet, shall be obtained by the Contractor from the existing roadway, at the direction of the Engineer, Materials which are similar in gradation and appearance may be mixed together for testing to develop the job mix formula.

E. Prior to the start of any pulverization work, a test report for the job mix formula must be submitted by the Contractor to the Engineer for approval. As a minimum, this report should indicate the following:

1. A gradation of the existing aggregate to a depth of six (6) inches below the surface, in its natural or original position.

2. The recommended optimum moisture content of the recycled base course prior to compaction in accordance with ASTM D 698, Method C.

3. The recommended optimum density of the recycled base course, after compaction, in accordance with ASTM D 698, Method C.

4. Density of the mixture in pounds per cubic foot (PCF) for both wet and dry.

5. The loose unit weight of the dry aggregate in pounds per cubic foot.

PART 3 – EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. The Contractor may use an equipment approved by the Engineer which will produce the completed base course meeting these specifications.

1. An asphalt stabilized recycled base course within 1/8 inch of design grade specified in the plans and meeting the moisture content and density requirements.

2. Pulverization of the existing asphaltic concrete pavement so that the usable material has a maximum size that does not exceed 2 inches in diameter. Pulverization shall be done with a pulverizing or milling machine acceptable to the Engineer. During pulverization, the Contractor shall protect all utility valve boxes, drainage structures (inlets, manholes, etc.), sanitary sewer manholes and survey monuments from possible damage by this operation. Any damage caused by the Contractor's operation shall be repaired by the Contractor at no cost to the Owner.

3. The Contractor will be required to use pulverizing or milling machine with a cutting blade width no greater than the paths being pulverized. A small milling machine with an attached breaker bar (to keep maximum size of aggregate at two inched) is suggested for the paths.

4. Regrading of the roadway – Following pulverization operations, the granular base within the roadway shall be regraded. The grading of the roadway must meet the following criteria:

a. Final gutter elevation where the curb and gutter exist shall be plus or minus 1/8 inch of existing gutter elevation.
b. Final gutter elevation where standard curbs exist shall be plus or minus 1/8 inch of existing theoretical base elevation.
c. Final elevation at meeting existing pavement lines shall be plus or minus 1/8 inch of existing theoretical base elevation.
d. Final centerline elevation shall be plus or minus 1/8 inch of theoretical base elevation.

5. Pulverized material may be moved from adjacent areas of the pavement in order to raise the grades or the pulverized material may be removed to adjacent areas in order to lower the grade.

   It is the Contractors responsibility to ensure that the criteria noted in Section 3 are met and adequate personnel must be assigned to the project to provide grading control. Failure to meet these criteria will be cause for rejection of the work. If any of the above criteria cannot be met due to existing conditions, the Contractor must notify the Engineer who will determine the solution to the grade problem.

6. If additional fill material is required in order to raise the grades as shown on the Plans, the material added shall conform to the Specification Section 321216.

7. If removal of material is required in order to lower the grades as shown on the Plans, all excavation required shall conform to the Specification Section 310000.

8. General – The moisture content of the recycled aggregate prior to the time of compaction shall be uniformly distributed through the recycled aggregate.

9. Aerating of the mixture may be required to reduce the excess water so that the liquid content does not exceed the requirements of these specifications. A water truck approved by the Engineer shall be available when it is necessary to add water.

10. The Contractor must have equipment and personnel on hand to determine the moisture content and monitor such during the mix operations.

3.02 COMPACTION

A. The type, size and weights of the compaction equipment shall conform to the standard specifications, and be capable of attaining the density requirements listed below.

B. The maximum depth of any compacted layer shall be 8 inches. Where the required course is more than 8 inches in total compacted depth, it shall be constructed in approximately equal depth layers.

C. The Contractor shall employ an independent testing laboratory approved by the Engineer to perform quality control testing prior to and during the compaction process. A quality control plan shall be submitted for approval to the Engineer not less than five (5) days before work starts.

D. During testing, the average in-place density shall be at least 95% of the lab density when tested. The testing laboratory shall provide a Nuclear-Density meter and personnel to control the final in-place density of the stabilized material. The meter shall also be used to determine the optimum number of roller passed required to achieve an acceptable density. The meter will be required for each day that the in-place stabilization operation is in progress.

3.03 FINISH GRADING

A. The finish grading operation shall conform to the required line and grade and cross sections specified under Section 321216. A period of curing of the recycled base will be required. The

application of the surface course shall not begin until approved by the Engineer. Surface paving shall commence within 48 hours of direction by the Engineer.

3.04 STABILIZATION OF SOFT AREAS

A. Following the grading and stabilization operations, if any unstable areas appear, the Contractor shall pulverize the area and test for the moisture content. If the moisture content is high, the Contractor shall aerate the material to reduce the moisture content. The material will be regraded and recompacted.

If unstable areas still remain, the Engineer may direct the Contractor to remove the existing base material to a depth of 6 inches and refill the area with Item 4 or RCA. The material shall be compacted as specified.

B. No additional payment will be made for repairing unstable areas caused by excessive moisture content or for any other conditions caused by failure to conform to the job mix formula, poor quality control or poor construction practices.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 320117 – PAVEMENT REPAIR AND RESURFACING

PART 1 – GENERAL

1.01 GENERAL

A. These specifications are intended to meet the latest edition of the N.Y.S.D.O.T. standard specifications U.S. Edition Section 400. It is the responsibility of the contractor to verify if the portions stated herein are current. This may be done by visiting the N.Y.S.D.O.T. website at: https://www.dot.ny.gov/main/business-center/engineering/specifications/english-spec-repository/2024_9_specs_usc_tc_vol2.pdf

B. GC shall be responsible for all work to be provide in conformance with sections referred to herein or within specification sections found on the N.Y.S.D.O.T. website.

C. Drawings and General Provisions of the Contract and Supplementary Conditions and Division 01 specification sections, apply to the work of this section.

1.02 SCOPE

A. Under this work the Contractor shall repair deteriorated pavement sections, clean and seal joints and cracks and clean pavement for the installation of new work.

B. New work shall be defined as any combination of the following:

1. Repair of asphalt pot holes and deteriorated sections of pavement.
2. New pavement markings
3. Seal coat
4. Asphalt overlay

1.03 RELATED SECTIONS

A. Section 014523 – Tests, Inspections, and Special Inspections Quality Assurance Plan
B. Section 033000 – Cast-In-Place Concrete
C. Section 310000 – Earthwork
D. Section 310001 – Site Work General Provisions
E. Section 310002 – Stakeout
F. Section 312500 – Erosion and Sediment Controls
G. Section 321216 – Asphalt Paving
H. Section 321216.11 – Asphalt Overlay
I. Section 321723 – Pavement Markings
J. Section 321723.11 – Pavement Markings (Thermoplastic)
K. Section 321723.12 – Pavement Markings (Pre-formed Reflectorized)
L. Section 334000 – Storm Drainage Utilities

1.04 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. The Contractor shall submit an asphalt job mix formula indicating the project name, date, contractor name, asphalt type & plant. The mix shall be in conformance with section 02600 and Table 403-1 Composition of Hot Mix Asphalt Mixtures, shown in that section.

C. The Contractor shall provide asphalt filler documentation proving that material will be obtained from one of the sources on the N.Y.S.D.O.T. approved materials list. Documentation shall also be provided that the filler meets the requirements of Table 702-2 Miscellaneous Asphalt Cements. A copy of the table can be found at the end of Part 2 of this section.

D. The Contractor shall provide asphalt emulsions documentation proving material will be obtained from N.Y.S.D.O.T. approved source. Additionally documentation indicating it if the material is anionic or cationic type, N.Y.S.D.O.T. material designation grade, and test data shall be provided.

E. For the recycled concrete aggregate (RCA) the Contractor shall submit a sieve gradation for approval by the architect. Along with sieve, the Contractor shall submit documentation that the material to be provided will be obtained from a N.Y.S.D.E.C. registered or permitted construction and demolition (C & D) debris processing facility as specified in Section 360-16.1 of 6NYCRR Park 360 “Solid Waste Management Facilities.” If blast furnace slag is to be used, provide beneficial use determination (BUD) prior to its use as specified in the 6NYCRR par 360-1.15, “Solid Waste Management Facilities.”

F. It shall be the Contractors responsibility upon the initial delivery of the materials and during subsequent deliveries, to take samples for testing as described In Section 1.06 Quality Assurance. If for any reason the Owner or Architect shall request the material be tested, the Contractor shall provide the samples free of charge. If requested the Contractor shall also perform, free of charge, core samples of the constructed work for testing. All test results will be copied to the Contractor for their record.

G. Contractor shall provide written certification on their company letterhead that all installed asphalt was produced and installed in accordance with N.Y.S.D.O.T. specifications and guarantee work against structural and material defects for a period of one year from completion date.

1.05 QUALITY ASSURANCE (RCA SUB-BASE)

A. The Contractor is responsible to establish and maintain required design, grades, lines and elevations including crown and cross-slope of sub base course.

B. The Contractor shall be responsible for Quality Assurance as described in Section 321216 – 1.05 – Quality Assurance (RCA Subbase).

1.06 QUALITY ASSURANCE FOR HOT MIX ASPHALT (HMA)

A. All materials for hot mix asphalt (HMA) production, such as, aggregates, PG binder, reclaimed asphalt pavement (RAP), mineral filler, or any other materials shall meet N.Y.S.D.O.T. requirements.

B. The Contractor shall be responsible for hot mix asphalt (HMA) quality assurance is described in Section 321216 – 1.06 - Quality Assurance for Hot Mix Asphalt (HMA).

PART 2 – MATERIALS

2.01 ASPHALT TYPES

A. Removal and Replacement: N.Y.S.D.O.T. Type 3 binder and N.Y.S.D.O.T. Type 6 top coat.

B. Crack Repair: N.Y.S.D.O.T. type 5 asphalt shim.

2.02 ASPHALT FILLER

A. Filler shall be asphalt cements and shall meet the requirements in Table 702-2 Miscellaneous Asphalt Cements found at the end of this section.

B. The asphalt cement shall be homogenous, free from water, and shall not foam when heated.

2.03 ASPHALT EMULSIONS TACK COAT

A. The emulsion shall be homogeneous and show no separation of asphalt, after thoroughly mixing, within 30 days after delivery, provided separation has not been caused by freezing. Emulsified asphalts held in storage tanks, drums or distributors for long periods are subject to settlement. The asphalt emulsion shall be agitated or circulated amply to ensure emulsion prior to testing. Material that has separated due to freezing is unacceptable at anytime. Asphalt emulsions shall meet the requirements shown in Table 702-5 Anionic Asphalt Emulsions and Table 702-6 Cationic Asphalt Emulsions both can be found at the end of this section.

PART 3 – EXECUTION

3.01 REMOVAL AND REPAIR OF DETERIORATED ASPHALT PAVEMENT SECTIONS

A. Contractor shall remove and dispose of deteriorated section of HMA pavements to sound material to the extent indicated on the drawings, such that all excavated sides are vertical. Use a chipping hammer, a milling machine equipped with a means to suppress airborne particles, or other appropriate means. The perimeter of repair shall be saw cut at the full depth of the repair section. (Full depth shall mean pavement and 6” RCA subbase).

B. Tamp or roll existing subgrade and/or subbase as required.

C. Clean and dry all surfaces exposed from removal operation such that they are clean and free of dust and debris.

D. Uniformly apply asphalt tack coat emulsion to these surfaces as described in Section 321216 – Part 3 - Execution.

E. Place the HMA in the repair areas only when the ambient temperature is 45ºF or greater. The minimum HMA placement temperature shall be 250ºF.

F. If the total depth of the patch is greater than 3 inches, compact the HMA in multiple lifts, thoroughly compact the lower lifts with a mechanical tamper.

G. Use N.Y.S. type 3 for binder patch and type 6 for top course patch.

H. For the top lift, thoroughly compact with a steel wheel roller or pneumatic roller. Slightly overfill the patch with HMA such that the resulting patch is dense, smooth, and no more than 1/4” inch above the existing surface.

I. When placing the shim course to fill wheel ruts in existing pavement, each wheel path rut must be paved separately. This placement equipment will be a drag box configuration or approved equal having side forms. Use the equipment to spread and strike off the shim course material to a uniform width of approximately 4 feet. The intent of the operation is to fill the low area only and to place the material for the pavement’s full lane width. The placement equipment wheels and/or other appurtenances must not interfere with the distribution and placement of the shim course material.

3.02 CRACK SEALING JOINTS & CRACKS

A. For pavement that requires stress relieving repairs, repair as per N.Y.S.D.O.T. specification section 633-3.05 prior to joint or crack repair work.

B. Contractor shall use a compressed air stream of at least 80 psi gauge measured at the source to clean all unsealed and inadequately sealed joints and cracks.

C. Clean all joints and cracks in the pavement of all dirt and loose material to a depth equal to a minimum of twice the crack or joint width, by holding the cleaning jet one inch above the pavement surface. Old joint and crack sealer remaining after cleaning operations need not be removed.

D. Contractor shall keep the joint and cracks clean until the sealing, filling and paving operations are complete.

E. Joints and cracks less than ¼" are not required to be cleaned or sealed.

F. Seal joints and cracks in the existing pavement from ¼" to 1" wide with an approved asphalt cement filler. To ensure that space will be available for expansion of the asphalt filler when HMA is paved over the joint or crack, do not fill the joint or crack completely to the surface. Blot with fine (as per N.Y.S.D.O.T. Section 703-01) aggregate if required to prevent tracking the bituminous material over the paved surface.

G. Fill joints and cracks greater than 1" wide with N.Y.S.D.O.T. type 5 asphalt shim.

3.03 CLEANING AND PREPARATION OF PAVEMENT SURFACES FOR PAVEMENT MARKING

A. The Contractor shall select the materials and equipment for cleaning and preparing pavement surfaces.

B. When the work is conducted under traffic, the Contractor shall supply all necessary flags, markers, signs, and other devices to maintain and protect traffic.

C. Whenever grinding, water blasting, dry sandblasting or other operations are performed, the work shall be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that will mislead or misdirect the motorist.

D. When removal and cleaning operations are complete, the Contractor shall first power broom and then blow off with compressed air the pavement to remove residue and debris resulting from the cleaning work.

E. The Contractor shall conduct removal and cleaning work in such a manner as to minimize airborne dust, and similar debris so as to prevent a hazard to motor vehicle operation or nuisance to property.

F. Care shall be taken to prevent damage to transverse and longitudinal joint sealers.

G. Cleaning and surface preparation work shall be confined to the surface of existing pavement markings that are specified for removal on the plans or as directed by the Architect.

H. Pavement markings shall be cleaned to the extent that 95% to 100% of the existing marking is removed. Removal operations shall be conducted in such a manner that no more than moderate color and/or surface texture change results on the surrounding pavement surface.

3.04 CLEANING EXISTING PAVEMENT PRIOR TO ASPHALT OVERLAY

A. Clean existing pavement and shoulder surfaces to be overlaid, including ruts and depressions, by the use of mechanical sweepers, hand brooms, or other means until the surfaces are free of all material which might interfere with the bond between the overlay material and existing surfaces.

B. Remove all debris from the pavement surfaces and dispose of in an appropriate manner. Keep the pavement clean until the overlay operations are completed.

3.05 COMPLETION OF WORK

A. Once repair, sealing and pavement cleaning and preparation are complete, refer to construction documents for additional scope.

B. If additional work is required by the Contract refer to related sections for additional components.

END OF SECTION

TABLE 702-2 MISCELLANEOUS ASPHALT CEMENTS		
MATERIAL DESIGNATION	**702-0700**	
GRADES	**18 - 60**	
Test Requirements	**Minimum**	**Maximum**
Penetration, 77ºF (25ºC), 100 g, 5 second (AASHTO T 49)	18	60
Flash Point, COC, ºF (AASHTO T 48)	393	-
Solubility in trichloroethylene, % (AASHTO T 44)	99.5	-
Softening Point, ºF (AASHTO T 53)	130	167
Loss on Heating, 325ºF (163ºC), 5 hour, % (AASHTO T 47)	-	1.0
Penetration of Residue, % of Original (AASHTO T 49)	60	-
Ductility, 77ºF (25ºC), 5 cm/minute, cm (AASHTO T 51)	5	-
Typical Uses	Joint & Crack Filler	

TABLE 702-5 ANIONIC ASPHALT EMULSIONS																				
TYPE	**RAPID SETTING**								**MEDIUM SETTING**								**SLOW SETTING**			
MATERIAL DESIGNATION	702-3001		702-3002		702-3101		702-3102		702-3201		702-3301		702-3401		702-3402		702-3501		702-3601	
GRADE	RS-1		RS-1h		RS-2		HFRS-2		MS-2		HFMS-2		HFMS-2h		HFMS-2s		SS-1		SS-1h	
Test Requirements	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Emulsion: Viscoity, Saybolt Furol, 77ºF (25ºC), second	20	100	20	100	-	-	-	-	100	-	100	-	100	-	50	-	20	100	20	100
Viscoity, Saybolt Furol, 122ºF (50ºC), second	-	-	-	-	75	400	75(1)	400 (1)	100 (1)	400 (1)	100	400	-	-	-	-	-	-	-	-
Storage Stability Test, 1 Day **(Difference in % Residue)**	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1
Demulsibility, 35 ml, 0.02 N, CaC12, %	60	-	60	-	60	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-
Cement Mixing Test, %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0 (4)	-	2.0 (4)
Sieve Test, %	-	0.10	-	0.10	-	0.10	-	0.1	-	0.1	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10
Residue by Distillation, %	55	-	55	-	63	-	63	-	65	-	65	-	65	-	65	-	57	-	57	-
Oil Distillate, Volume Total Emulsion, %	-	2	-	2	-	3	-	3	-	10	-	10	-	3	-	10	-	-	-	-
Residue from Distillation Test: Penetration, 77ºF (25ºC), 100 g, 5 second	100	200	40	90	100	200	100	200	100	200	100	200	40	90	200	-	100	200	40	90
Ductility, 77ºF (25ºC), 5 cm/minute, cm	40	-	40	-	40	-	40	-	40	-	40	-	40	-	40	-	40	-	40	-
Solubility in trichloroethylene, %	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-
Float Test[2], 140ºF (60ºC), second	-	-	-	-	-	-	1200	-	-	-	1200	-	1200	-	1200	-	-	-	-	-
Suggested Temperature Range: Mixing, ºF	-	-	-	-	-	-	-	-	100	170	100	170	75	170	75	170	75	140	75	140
Spraying, ºF	75	150	75	150	130	170	130	170	130	170	130	170	75	170	-	-	75	140	75	140
Typical Applications:[3]	Spray Patch		Tack Coat for HMA		Surface Treatment				Base and Shoulder Stabilization, Cold Mixes, Shoulder Seal				Hot & Cold Mixes		Stockpile Patching Mix		Base and Shoulder Stabilization			

Notes:

1. This viscosity requirement at 122ºF (50ºC) applies to emulsion used for shoulder sealing.
2. Float Test AASHTO T50, except that the residue from distillation shall be poured immediately into the float collar at 500ºF (260ºC).
3. These typical applications are intended only as a guide for selecting the proper emulsion grade.
4. The cement mixing test is waived if this grade of emulsion is used for stabilization.

TABLE 702-6 CATIONIC ASPHALT EMULSIONS																
TYPE	**RAPID SETTING**						**MEDIUM SETTING**				**SLOW SETTING**				**QUICK SETTING**	
MATERIAL DESIGNATION	**702-4001**		**702-4002**		**702-4101**		**702-4201**		**702-4301**		**702-4401**		**702-4501**		**702-4601**	
GRADE	**CRS-1**		**CRS-1h**		**CRS-2**		**CMS-2**		**CMS-2h**		**CSS-1**		**CSS-1h**		**CQS-1h**	
Test Requirements	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Emulsion: Viscoity, Saybolt Furol, 77ºF (25ºC), second	20	100	20	100	-	-	-	-	-	-	20	100	20	100	20	100
Viscoity, Saybolt Furol, 122ºF (50ºC), second	-	-	-	-	100	400	50	450	50	450	-	-	-	-	-	-
Storage Stability Test, 1 Day **(Difference in % Residue)**	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1
Classification Test	Passes		Passes		Passes		---		---		---		---		---	
Particle Charge Test	Positive		Positive		Positive		Positive		Positive		Positive(1)		Positive(1)		Positive(1)	
Sieve Test, %	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10
Cement Mixing Test, %	-	-	-	-	-	-	-	-	-	-	-	2.0(3)	-	2.0(3)	-	-
Residue by Distillation, %	60	-	60	-	65	-	65	-	65	-	57	-	57	-	62	-
Oil Distillate, Volume Total Emulsion, %	-	3	-	3	-	3	-	12	-	12	-	-	-	-	-	-
Residue from Distillation Test: Penetration, 77ºF (25ºC), 100 g, 5 second	100	250	40	90	100	250	100	250	40	90	100	250	40	90	40	90
Ductility, 77ºF (25ºC), 5 cm/minute, cm	40	-	40	-	40	-	40	-	40	-	40	-	40	-	40	-
Solubility in trichloroethylene, %	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-
Suggested Temperature Range: Mixing, ºF	-	-	-	-	-	-	100	170	100	170	75	150	75	150	75	150
Spraying, ºF	75	140	75	140	130	170	130	170	130	170	75	150	75	150	-	-
Typical Applications:(2)	Spray Patch		Tack Coat for HMA		Surface Treatment		Cold Mixes				Base and Shoulder Stabilization				Quick-Set Slurry Seal	

Notes:

1. If the Particle Charge Test result is inconclusive, material having a maximum pH value of 6.7 will be acceptable.
2. These typical applications are intended only as a guide for selecting the proper emulsion grade.
3. The cement mixing test is waived if this grade of emulsion is used for stabilization.

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321216 – ASPHALT PAVING

PART 1 – GENERAL

1.01 GENERAL

A. GC shall be responsible for all work to be provided in conformance with sections referred to herein.

B. Drawings and General Provisions of the Contract and Supplementary conditions and Division 01 specification sections, apply to the work of this section.

1.02 SCOPE

A. The work of this section applies to all recycled concrete aggregate (RCA) sub-base and hot mix asphalt items in the contract. The work shall consist of preparing the existing subgrade material to receive the new RCA sub-base, as well as furnishing, mixing, spreading and compacting the RCA sub-base, dense asphalt binder course and the asphalt top course to the lines, grades, and dimensions shown on the plans and as specified herein.

B. Unless shown otherwise indicated on plans the new pavement system for roads and parking lots shall be as follows:

1. Recycled concrete aggregate sub-base course shall be 6” thick (compacted)

2. Dense asphalt binder course shall be 3 ½ inches (compacted), Type 3.

3. Asphalt top course shall be 1 ½ inches thick, Type 6F3.

C. Unless otherwise indicated on plans the pavement systems for tracks and tennis courts shall be as follows:

1. Tracks:

   a. Recycled concrete aggregate sub-base course shall be 6” thick (compacted).

   b. Dense asphalt binder course shall be 2 ½ inches (compacted) thick, Type 3.

   c. Asphalt top course shall be 1 ½ inches thick, Type 7.

2. Tennis Courts:

   a. Recycled concrete aggregate sub-base course shall be 6” thick (compacted), Type 1.

   b. Dense asphalt binder course shall be 2 ½ inches (compacted) thick, Type 3.

   c. Asphalt top course shall be 1 ½ inches thick, Type 7.

D. Unless otherwise indicated on plans, asphalt play surfaces and walks shall be 2” Type 7 asphalt over 6” RCA.

1.03 RELATED SECTIONS

A. Section 014523 – Tests, Inspections, and Special Inspections Quality Assurance Plan

B. Section 033000 – Cast-In-Place Concrete
C. Section 310000 – Earthwork
D. Section 310001 – Site Work General Provisions
E. Section 310002 – Stakeout
F. Section 312500 – Erosion and Sediment Controls
G. Section 320117 – Pavement Repair and Resurfacing
H. Section 321216.11 – Asphalt Overlay
I. Section 321723 – Pavement Markings
J. Section 334000 – Storm Drainage Utilities

1.04 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. For the recycled concrete aggregate (RCA) the Contractor shall submit a sieve gradation for approval by the architect. Along with sieve, the Contractor shall submit documentation that the material to be provided will be obtained from a N.Y.S.D.E.C. registered or permitted construction and demolition (C & D) debris processing facility as specified in Section 360-16.1 of 6NYCRR Part 360 “Solid Waste Management Facilities.” If blast furnace slag is to be used, provide beneficial use determination (BUD) prior to its use as specified in the 6NYCRR par 360-1.15, “Solid Waste Management Facilities.”

C. For the asphalt binder and top course, the Contractor shall submit to the Architect for approval, the job mix formula with current date, job location, asphalt plant, and contractor name. The type of asphalt and course shall also be stated. The job mix formula sheet shall indicate the gradations of the aggregates to be used in the mix along with the PGB content.

D. It shall be the Contractors responsibility upon the initial delivery of the materials and during subsequent deliveries, to take samples for testing as described In Section 1.06 Quality Assurance. If for any reason the Owner or Architect shall request the material be tested, the Contractor shall provide the samples free of charge. If requested the Contractor shall also perform, free of charge, core samples of the constructed work for testing. All test results will be copied to the Contractor for their record.

E. Contractor shall provide written certification on their company letterhead that all installed asphalt was produced and installed in accordance with these specifications and guarantee work against structural and material defects for a period of one year from completion date.

F. Interim and final as-built surveys; reference Quality Assurance section below and Specification Section 017839.

1.05 QUALITY ASSURANCE (RCA SUB-BASE)

A. The Contractor is responsible to establish and maintain required design, grades, lines and elevations including crown and cross-slope of sub base course.

B. An independent testing laboratory, selected and paid for by the Owner shall be retained to perform construction testing of the in place sub-base course, for compliance with the Contract Documents. The Contractor shall arrange for and schedule the testing. The sub-base course shall be checked for thickness and tolerance by rod and level readings on a 50 ft. grid or as directed by the Architect. Readings shall be to +0.05’ of design elevation that allow for asphalt thickness as shown on the Contract Documents. The Contractor shall at no cost to the Owner provide instruments personal and a suitable benchmark. Any deficiencies shall be corrected prior to proceeding with paving operations.
   1. Prior to paving parking lots or plaza areas greater than 10,000 sf, the contractor shall provide an interim topographical survey of the RCA Sub-base in the datum of the Construction

Documents for review for conformance by the Architect. Said survey is required to be performed a licensed land surveyor. Spot elevations on said survey shall be in complimentary locations to the Construction Drawings.

C. The following tests shall be performed on the sub-base material ASTM 1557 or ASTM D698 compaction test to determine % of compaction and molding water content needed to achieve the required engineering properties of the sub-base.

D. The following test shall be performed on the sub-base material ASTM D4318 determination of the liquid limit, plastic limit, and the plasticity index of soils.

E. In place sub-base material shall be tested in accordance with ASTM D1556 to determine the in place density and unit weight of soils using a sand cone apparatus, or ASTM D2167 to determine the in place density and unit weight of the compacted sub-base.

F. The sub-base material shall be compacted to not less than 98% of optimum density as determined by ASTM D698 or 95% as determined by ASTM D1557, unless otherwise indicated on the drawings.

G. The in place sub-base material shall be tested for thickness and compaction for each 5,000 square feet for jobs up to 20,000 s.f. and for each 10,000 s.f. for jobs larger than 20,000 s.f.

H. The independent testing laboratory shall prepare test reports that indicate test location, elevation data from a construction site benchmark, and test results. The Owner, Architect and Contractor shall all be provided with copies of reports within 96 hours of the time the test was performed. In the event that any test performed fails to meet these specifications, the Owner and the Contractor shall be notified immediately by the testing laboratory. It shall be the Contractor's responsibility to correct any non-conforming work at no additional cost to the Owner and pay for all additional testing by the independent testing laboratory to prove corrective work is in conformance with these specifications.

1.06 QUALITY ASSURANCE FOR HOT MIX ASPHALT (HMA)

A. All materials for hot mix asphalt (HMA) production, such as, aggregates, PG binder, reclaimed asphalt pavement (RAP), mineral filler, or any other materials shall meet the requirements of Section 2.

B. The Contractor shall be responsible for quality control (QC). QC is defined as all activities required to produce HMA that meets all specification requirements. The Contractor shall provide HMA and assume all responsibilities for all QC activities at the production facilities.

C. Methods of Sampling and Testing

1. All HMA material shall be sampled and the properties enumerated in these specifications shall be determined in accordance with the following methods, as currently revised.
   a. Sampling mineral aggregates ASTM: D-75
   b. Sampling bituminous mixtures ASTM: D-979
   c. Sieve analysis of aggregates ASTM: C-136
   d. Determination of bitumen content ASTM: D-1097
   e. Specific gravity of coarse aggregate ASTM: C-127
   f. Specific gravity of fine aggregate ASTM: C-128
   g. Sieve analysis of mineral filler ASTM: D-546
   h. Sampling bituminous materials ASTM: D-140
   i. Liquid limit, plastic limit & plasticity index ASTM: D-4318
   Or current applicable methods recommended by the American Association of State Highway Officials, and/or The Asphalt Institute.

D. The PG binder will be accepted on the basis of PG binder suppliers certification. The Contractor shall provide a copy to the Architect.

PART 2 – MATERIALS

2.01 COMPOSITION OF MIXTURES (RCA)

A. Recycled concrete aggregate sub-base.

1. Provide RCA which meets the specification material requirements and is within the Contractors capabilities to place and fine grade to the required tolerances.

2. Furnish materials of at least 95%, by weight, of recycled portland cement concrete aggregate (RCA), and free from organic and other deleterious material. This material may contain up to 5% by weight asphalt and/or brick.

3. Gradation for RCA shall conform to the following:

Sieve Size Designation	Percent Passing by Weight
4 inch	-
3 inch	100
2 inch	90 – 100
¼ inch	30 – 65
No. 40	5 – 40
No. 200	0 -10

4. Material will be accepted on the basis of magnesium sulfate soundness loss after four cycles of 20% or less. The required plasticity index of the material passing the No. 40 sieve is 5.0 or less.

5. A flat or elongated particle is defined herein as one which has its greatest dimension more than three times its least dimension. Provide material consisting of particles where not more than 30% by weight, of the particles retained on a ½ inch sieve are flat or elongated. Material with a percentage greater than 30 will be rejected.

2.02 COMPOSITION OF MIXTURES (HMA)

A. The HMA plant mix will generally be composed of a mixture of aggregate and reclaimed asphalt pavement (RAP), filler if required, and PG binder. For any HMA required by the plans, formulate a job mix formula that satisfies the general limits of Table 1. A copy of this table can be found at the end of this section. See section 1.02B for system components. For type 6F3 mixture, determine the optimum asphalt content for the proposed gradation using the Marshall mix design method (50 blows). The resultant mixture shall meet the following Marshall properties.

Mix Property	Type 6F3
Air Voids %	3.0 – 5.0
Voids in Mineral Aggregate	14
Voids filled with Binder VFB, %	65 - 78

Contractor shall produce, deliver to the work site, and incorporate the mixture into the work within the mixing and placing temperature range imposed by Table 1 Composition of Marshall designed plant mixtures. The plant mixed material will be accepted after blending and mixing at the plant. The pavement courses will be accepted after all paving operations are completed and certified by the Contractor.

B. Fine aggregate may consist of screenings, free from deleterious materials and manufactured from sources of stone, gravel, or slag.

C. Coarse aggregate will consist of crushed stone, crushed gravel or crushed slag.

D. When aggregates from approved natural fine sand sources are combined with coarse aggregates in the mixture, aggregate particles will meet additional requirements as follows:

   1. Particles in the No. 1A and No. 1 primary sizes will have a minimum of 85% by weight, of the particles with at least two fractured faces.

   2. Particles in the No. 2, No. 3 and No. 3A primary sizes will have a minimum of 75%, by weight, of the particles with at least one fractured face.

E. Coarse aggregate type 6F3 conditions:

   1. Limestone or a blend of limestone and dolomite having an acid-insoluble residue content of not less than 20%

   2. Dolomite

   3. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

   4. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore trailings, slag or other similar materials meeting the following requirements:

      a. (Type 6F3 Mixes) non-carbonate plus 1/8-inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes of materials of different specific gravities). Additionally, a minimum of 20% plus ¼ inch particles must be non-carbonate.

      b. When coarse aggregate for these mixes are from more than one source or of more than one type of material, proportion and blend them to provide a uniform mixture.

F. Performance Graded Binder. Unless the type of PG Binder is specified in the Contract Documents, use PG 64-22.

G. Reclaimed asphalt pavement (RAP) shall meet the requirements of a superpave hot mix asphalt mixture design and mixture verification procedures.

TABLE 1 COMPOSITION OF HOT MIX ASPHALT MIXTURES												
Mixture	**Base**				**Binder**		**Shim**		**Top3,4**			
Require-ments[1]	**Type 1**		**Type 2**		**Type 3**		**Type 5**		**Type 6, 6F2, 6F3**		**Type 7, 7F2, 7F3**	
Screen Sizes	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**
2 in	100	-	100	-	-		-	-	-	-	-	-
1 ½ in	90-100	-	75-100	±7	100	-	-	-	-	-	-	-
1 in	78-95	±5	55-80	±8	95-100	-	-	-	100	-	-	-
½ in	57-84	±6	23-42	±7	70-90	±6	-	-	95-100	-	100	-
¼ in	40-72	±7	5-20	±6	48-74	±7	100	-	65-85	±7	90-100	
1/8 in	26-57	±7	2-15	±4	32-62	±7	80-100	±6	36-65	±7	45-70	±6
No. 20	12-36	±7	-	-	15-39	±7	32-72	±7	15-39	±7	15-40	±7
No. 40	8-25	±7	-	-	8-27	±7	18-52	±7	8-27	±7	8-27	±7
No. 80	4-16	±4	-	-	4-16	±4	7-26	±4	4-16	±4	4-16	±4
No. 200	2-8	±2	-	-	2-8	±2	2-12	±2	2-6	±2	2-6	±2
PGB Content %[2]	4.0-6.0	0.4	2.5-4.5	0.4	4.5-6.5	0.4	7.0-9.5	0.4	5.4-7.0	NA	5.7-8.0	NA
Mixing &5 Placing Temp. Range, ºF	250-325		225-300		250-325		250-325		250-325		250-325	
Description and Typical Uses	Dense Base: For general use		Open Base: For permeable base layer		Dense Binder: Intermediate layer for general use		Shim: Fine HMA mixture for shimming ruts and leveling		Top Course: Dense course for single course resurfacing of rural, suburban, and urban roadways			

1. All aggregate percentages are based on the total weight of the aggregate.
2. The asphalt content is based on the total weight of the mix. When using slag aggregates in the mix, increase the PGB content accordingly, a minimum of 25% for an all slag mix.
3. 6F2, 6F3, 7F2, 7F3 mix types require friction coarse aggregates, and are required for mainline driving surface courses.
4. For Type 6 and Type 7 (F9) aggregate requirements, Marshall design will not be required. These mix types are suitable where the State's requirements for f9 aggregate apply.
5. Introduce the PG Binder into the pug mill between 225ºF and 350ºF, or as recommended by the PG Binder supplier.

2.03 TACK COAT

A. Tack coat shall meet the requirements of Tabe 2.

TABLE 2 – TACK COAT		
Test Requirements	Min	Max
Sieve Test, %	-	0.10
Residue by Distillation %	38	45
Oil Distillate, volume of total emulsion %	-	2
Test on Residue Distillation: penetration, 77ºF (25ºC), 100g, 5 second	40	90
Suggested spraying temp, ºF	75	150

B. Application of Emulsion Material

1. The asphalt emulsion contained in the distributor tank shall be homogenous. Emulsified asphalts held in storage tanks, drums, or distributors for long periods are subject to settlement. The asphalt emulsion shall be sufficiently agitated or circulated to ensure a homogenous emulsion prior to sampling or application.

PART 3 – EXECUTION

3.01 PREPARATION OF SUBGRADE

A. The subgrade surface is the surface of the pavement section upon which the select materials and/or sub-base are placed. The Contractor shall be responsible to cut and fill subgrade as required to achieve design grades. The subgrade area shall be prepared in conformance with Section 310000. It shall be the Contractor's responsibility to properly place and compact all materials in the road section and to correct any deficiencies resulting from insufficient or improper compaction of such materials throughout the Contract period. The Contractor shall determine the type, size and weight of the compactor best suited to the work at hand, select and control the lift (layer) thickness, exert control over the moisture content of the material, and other details necessary to obtain satisfactory results. The subgrade shall be compacted to density in accordance with section 310000 – Earthwork, but not less than 95% of modified proctor maximum dry density.

3.02 RCA SUBBASE

A. RCA subbase course shall be placed in conformance with Section 310000.

B. Contractor shall place RCA in a single layer with a minimum compacted layer thickness of 6 inches.

C. When the moisture content is within the limits for proper compaction, compact the material in accordance with the requirements of Section 310000.

D. If the subbase course is disturbed by frost action prior to paving, re-compact the subbase.

E. If, in the opinion of the Architect, the subbase is damaged or mixed with the subgrade or any other material due to the Contractor's operation the Contractor shall remove such material and replace it with the appropriate subbase at no additional cost to the Owner.

F. Place subbase so that after compaction the top surface of the course does not extend more than ¼" above nor more than ¼" below true grade for the course at any location.

3.03 CONDITIONS FOR PLACEMENT OF ASPHALTIC MATERIALS

A. Weather – Seasonal Limitations

1. The mixing and place of hot-mix asphalt shall be performed only when weather conditions are suitable. When pools of water are observed on the base, mixing and placing of hot-mix asphalt shall not be permitted. The temperature of the surface on which hot-mix asphalt is placed shall be as per Table 3.

2. Bituminous concrete pavement placed between November 30th and April 1st shall be subject to the following conditions and regulations:

    a. Approval of the Engineer.
    b. Compliance with Table 3 below.
    c. Acceptance of full responsibility by the Contractor for all work so placed.
    d. Providing for such guarantees and deposits as are required by Town regulations.
    e. Guarantee of all work so placed for a period extending up to one year. A notification from the Engineer before the end of the last month of the calendar year following shall be deemed to be within the period of guarantee.

TABLE 3 TEMPERATURE AND SEASONAL REQUIREMENTS		
Nominal Compacted Lift Thickness	**Surface Temperature (Minimum (Note 1)**	**Seasonal Limits**
≤ 1 in.	50ºF	(Notes 2 & 3)
1 in.<Thickness ≤ 3 in.	45ºF	(Notes 2 & 3)
>3 in.	40ºF	None

NOTES:
1. Measure all temperatures on the surface where the mixture is to be placed and the controlling temperature will be the average of three temperature readings taken at locations a minimum of 25 ft apart.
2. Unless otherwise authorized place Top Course only during the period of April 1st up to and including November 30th in the counties of Dutchess, Orange, Rockland, Putnam, Westchester, Nassau, Suffolk, and the City of New York.
3. Unless otherwise authorized place Top Course only during the period of April 15th up to and including October 31st in all counties except as required in Note 2.

3.04 TACK COAT

A. Apply a thin, uniform tack coat to surfaces of existing asphalt, Portland cement concrete layers including such areas as adjacent pavement edges, curbing, gutters, manholes, and other structures, immediately prior to place the HMA mixture against them.

B. Apply tack coat on the contact surfaces between all HMA pavement lifts prior to placing HMA mixture regardless of time period between lifts. The only exception to this is the surface of permeable base courses. Paving over a tack coat should not commence until the emulsion has broken (goes from brown to black) or is tacky when touched.

C. The tack coat shall be applied to a prepared clean pavement and in a manner to offer the least inconvenience to traffic and to reduce pickup or tracking of the bituminous material. Upon application the material shall be as uniformly spread across the width of the designated area.

D. The tack coat shall not be applied on a wet pavement surface or when the pavement surface temperature is below the temperature requirements outlined in Table 3 Temperature and Seasonal Requirements. To avoid “boil-off” of the water, the asphalt emulsion shall not be heated above 195ºF. The application rate shall be as determined in Table 4.

TABLE 4 TACK COAT APPLICATION RATES	
Surface Type	**Application Rate (gallons per square yard)**
New Hot Mix Asphalt	0.03 – 0.04
Milled Surfaces	0.05 – 0.06
Portland Cement Concrete	0.05 – 0.06
Vertical Surfaces (curbs, drainage structures, and appurtenances)	0.06-0.07

3.05 SPREADING AND FINISHING OF HMA

A. Lay the mixture upon an approved clean, tack coated surface. The only exception to this is the surface of permeable base courses. Spread and strike off to the established grade and elevation. Use HMA paver(s) to distribute the mixture either over the entire width or over such partial width as may be practicable. Upon arrival at the site, the trucks will dump the mixture into the paver. Immediately spread and strike off to the required width and appropriate loose depth to obtain the required compacted thickness at completion of the work.

B. When the initial pavement course is laid with automatic HMA pavers, guide the paver by a taut reference line positioned at or near the pavement centerline or edge. Erect and maintain the reference line. Support the reference line at approximately 25 foot intervals on tangent sections and at closer intervals on curves. Tension the line sufficiently to remove any sags. A moving reference of at least 30 ft. in length in lieu of a reference line may be used. The moving reference may be a floating beam, ski, or other suitable type such that the resulting pavement layer surface is sufficiently even. A short ski or shoe may also be used for the initial course if a satisfactory fixed reference such as a curb, gutter, or other fixed reference is adjacent to the pavement. When the proposed floating beam or the short ski does not produce the results similar to those obtained using a taut reference line, do not use these devices.

C. Place subsequent pavement courses over the initial course using one of the above methods. In addition, any course in an adjacent lane may be used as the reference for the use of a short ski.

D. The automatic screed controls will not be required where existing grades at roadway intersection or drainage structure must be met, for shoulders, temporary detours, behind curbs, or in other areas where its use is impractical.

E. If there are less than 1500 square yards in the Contract, or the areas to be paved are small and scattered, the HMA mixture may be spread by hand methods. For these areas, dump and spread the mixture such that the compacted thickness meets the specified thickness in the plans.

F. Prior to the beginning of rolling, check the loose mat, adjust any irregularities, and remove and replace all unsatisfactory material.

3.06 COMPACTION OF HMA

A. Immediately after the HMA mixture has been spread, struck off and surface irregularities adjusted, thoroughly and uniformly compact it by rolling. Roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking or shoving. Initially roll all courses with the roller traveling parallel to the centerline of the pavement beginning at each edge and working toward the center. Roll banked curves starting at the low side edge and working toward the super elevated edge.

B. Correct at once any displacement occurring as a result of reversing the direction of the roller, or from other causes, by the use of rakes and addition of fresh mixture as required. Exercise care in rolling so as not to displace the line and grade of the edges of the HMA mixture. To prevent adhesion of the mixture to the drum(s) and pneumatic tires, keep the drum(s) and the pneumatic tires properly moistened with water or water mixed with small quantities of detergent or other approved material. Any petroleum products or solvents having an adverse effect upon the HMA pavement will not be permitted for use.

C. There shall be no visible defects, such as shallow ruts, ridges, roller marks, cracking, tearing, segregation, or any other irregularities as determined by the Architect, in the pavement when the rolling operation is complete. If these defects are present, correct these defects to the satisfaction of the Architect or remove & replace the pavement at no additional cost.

D. Along forms, curbs, headers, walls and other areas not accessible to the rollers, thoroughly compact the mixture with mechanical tampers. On depressed areas, use a trench roller or a small vibratory roller. Cleated compression strips may also be used under the roller to transmit compression to the depressed area.

E. Remove and replace any mixture that becomes loose and broken, mixed with dirt, or is in any way defective with fresh HMA mixture which shall be compacted to conform with the surrounding area. Correct any area showing an excess or deficiency of HMA material to the satisfaction of the Architect.

F. Compaction shall be per Three Roller Compaction Train

1. Initially roll all HMA mixtures with an approved steel-wheel roller operating in a static mode. Overlap the previous roller passes by one-half the width of the roller.
2. Immediately following the initial rolling, roll the mat with an approved pneumatic rubber-tired roller. A minimum of 3 passes of the rubber-tired roller will be required. One pass is defined as one movement of the roller over any point of the pavement in either direction.
3. Immediately following the intermediate rolling, finish roll the mat with a steel-wheel roller to remove all shallow ruts, ridges, roller marks and other irregularities from the surface.
4. Use this compaction method only when the compacted thickness of the finished mat is 4 inches or less. Unless approved by the Architect, the roller speeds shall not exceed 3 mph. when paving multiple lanes simultaneously; increase the required number of rollers proportionately for each additional full lane width unless otherwise permitted by the Architect.

G. The required number of passes listed in Table 5, Number of Passes, is recommended and may be increased as necessary to achieve adequate density.

TABLE 5 NUMBER OF PASSES

Pavement Courses	Three Roller Train (Static)	
	Steel Wheel Roller	Pneumatic Roller
Base (Open Graded Each Lift)	4	3
Base (Dense-Graded)	4	3
Binder (Dense-Graded)	2	3
Top (Dense-Graded All Types)	2	3

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321216.11 – ASPHALT OVERLAY

PART 1 – GENERAL

1.01 GENERAL

A. These specifications are intended to meet the latest edition of the N.Y.S.D.O.T. standard specifications U.S. Edition Section 400. It is the responsibility of the contractor to verify if the portions stated herein are current. This may be done by visiting the N.Y.S.D.O.T. website at: https://www.dot.ny.gov/main/business-center/engineering/specifications/english-spec-repository/2024_9_specs_usc_tc_vol2.pdf

B. GC shall be responsible for all work to be provided in conformance with sections referred to herein or within specification sections found on the N.Y.S.D.O.T. website.

C. Drawings and General Provisions of the Contract and Supplementary Conditions and Division 01 specification sections, apply to the work of this section.

1.02 SCOPE

A. Under this section the Contractor shall provide and install asphalt overlay over existing asphalt pavement that has been repaired as specified in Section 320117.

1.03 RELATED SECTIONS

A. Section 014523 – Tests, Inspections, and Special Inspections Quality Assurance Plan
B. Section 033000 – Cast-In-Place Concrete
C. Section 310000 – Earthwork
D. Section 310001 – Site Work General Provisions
E. Section 310002 – Stakeout
F. Section 312500 – Erosion and Sediment Controls
G. Section 320117 – Pavement Repair and Resurfacing
H. Section 321216 – Asphalt Paving
I. Section 321723 – Pavement Markings
J. Section 321723.11 – Pavement Markings (Thermoplastic)
K. Section 321723.12 – Pavement Markings (Pre-formed Reflectorized)
L. Section 334000 – Storm Drainage Utilities

1.04 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. For the asphalt, the Contractor shall submit to the Architect for approval, the job mix formula with current date, job location, asphalt plant, and contractor name. The type of asphalt and course shall also be stated. The job mix formula sheet shall indicate the gradations of the aggregates to be used in the mix along with the PGB content.

C. It shall be the Contractors responsibility upon the initial delivery of the materials and during subsequent deliveries, to take samples for testing as described in Section 1.06 – Quality Assurance. If for any reason the Owner or Architect shall request the material be tested, the Contractor shall provide samples free of charge. If requested the Contractor shall also perform free of charge, core samples of the constructed work for testing. All test results will be copied to the Contractor for their record.

D. Contractor shall provide written certification on their company letterhead that all installed asphalt was produced and installed in accordance with N.Y.S.D.O.T. specifications and guarantee work against structural and material defects for a period of one year from completion date.

1.05 QUALITY ASSURANCE FOR HOT MIX ASPHALT (HMA)

A. All materials for hot mix asphalt (HMA) production, such as, aggregates, PG binder, reclaimed asphalt pavement (RAP), mineral filler, or any other materials shall meet N.Y.S.D.O.T. requirements.

B. The Contractor shall be responsible for quality control (QC). QC is defined as all activities required to produce HMA that meets all specification requirements. The Contractor shall provide HMA and assume all responsibilities for all QC activities at the production facilities.

C. Methods of Sampling and Testing

1. All HMA material shall be sampled and the properties enumerated in these specifications shall be determined in accordance with the following methods, as currently revised.

   a. Sampling mineral aggregates ASTM: D-75
   b. Sampling bituminous mixtures ASTM: D-979
   c. Sieve analysis of aggregates ASTM: C-136
   d. Determination of bitumen content ASTM: D-1097
   e. Specific gravity of coarse aggregate ASTM: C-127
   f. Specific gravity of fine aggregate ASTM: C-128
   g. Sieve analysis of mineral filler ASTM: D-546
   h. Sampling bituminous materials ASTM: D-140
   i. Liquid limit, plastic limit & plasticity index ASTM: D-4318

   Or current applicable methods recommended by the American Associating of State Highway Officials, and/or the Asphalt Institute.

D. The PG binder will be accepted on the basis of PG binder suppliers certification. The Contractor shall provide a copy to the Owner.

PART 2 – MATERIALS

2.01 ASPHALT EMULSION TACK COAT

A. See Specification Section 320117 – Asphalt Repair, Crack Sealing & Cleaning/Preparation of Pavement Surface for Marking of these specifications.

2.02 HOT MIX ASPHALT OVERLAY

A. Hot mix asphalt overlay shall be N.Y.S.D.O.T. type 6F3 in parking areas and type 7 when overlaying play areas. The overlay compacted thickness shall be two inches.

2.03 COMPOSITION OF MIXTURES (HMA)

A. The HMA plant mix will generally be composed of a mixture of aggregate reclaimed asphalt pavement (RAP), filler if required, and PG binder. For any HMA required by the plans, formulate a job mix formula that satisfies the general limits imposed by N.Y.S.D.O.T. Table 403-1 Composition of Hot Mix Asphalt Mixtures latest version). A copy of this table can be found at the end of this section. For type 6F3 mixture, determine the optimum asphalt content for the proposed gradation

musing the Marshall mix design method (50 blows). The resultant mixture shall meet the following Marshall properties.

Mix Property	Type 6F3
Air Voids %	3.0 – 5.0
Voids in Mineral Aggregate	14
Voids filled with Binder VFB, %	65 - 78

Contractor shall produce, deliver to the work site, and incorporate the mixture into the work within the mixing and placing temperature range imposed by Table 403-1 Composition of Marshall designed plant mixtures. The plant mixed material will be accepted after blending and mixing at the plant. The pavement courses will be accepted after all paving operations are completed and certified by the Contractor.

B. Fine aggregate will consist of materials conforming to the requirements of Section 703-01 - Fine Aggregate of the N.Y.S.D.O.T. specifications. In addition, fine aggregate may consist of screenings, free from deleterious materials and manufactured from sources of stone, gravel, or slag meeting the requirements of N.Y.S.D.O.T. specification section 703-02, Coarse Aggregate.

C. Coarse aggregate will consist of crushed stone, crushed gravel or crushed slag conforming to the N.Y.S.D.O.T. requirements of section 703-02, Except for Gradation.

D. When aggregates from approved natural fine sand sources are combined with coarse aggregates in the mixture, aggregate particles will meet additional requirements as follows:

1. Particles in the No. 1A and No. 1 primary sizes will meet the quality requirements of N.Y.S.D.O.T. specification section 703-02 and will have a minimum of 85% by weight, of the particles with at least two fractured faces.

2. Particles in the No. 2, No. 3 and No. 3A primary sizes will meet the quality requirements of N.Y.S.D.O.T. section 703-02 and will have a minimum of 75%, by weight, of the particles with at least one fractured face.

E. Coarse aggregate type 6F3 conditions:

1. Limestone or a blend of limestone and dolomite having an acid-insoluble residue content of not less than 20%

2. Dolomite

3. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

4. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore trailings, slag or other similar materials meeting the following requirements:

   a. (Type 6F3 Mixes) non-carbonate plus 1/8 inch particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes of materials of different specific gravities). Additionally, a minimum of 20% plus ¼ inch particles must be non-carbonate.

   b. When coarse aggregate for these mixes are from more than one source or of more than one type of material, proportion and blend them to provide a uniform mixture.

F. Mineral filler if required in the mix to meet gradation requirements, shall conform to the requirements of the N.Y.S.D.O.T. specification section 703-08, Mineral Filler.

G. Performance graded binder (PG Binder) shall meet the requirements of the N.Y.S.D.O.T. specification section 401-2.04, Performance Graded Binder. Unless the type of PG Binder is specified in the Contract Documents, use PG 64-22, or a PG Binder specified in Table 6-4, Performance Graded Binder section of Chapter 6 of the Comprehensive Pavement Design Manual.

TABLE 403-1 COMPOSITION OF HOT MIX ASPHALT MIXTURES

Mixture	**Base**				**Binder**		**Shim**		**Top3,4**			
Require-ments[1]	**Type 1**		**Type 2**		**Type 3**		**Type 5**		**Type 6, 6F2, 6F3**		**Type 7, 7F2, 7F3**	
Screen Sizes	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**	**General limits % Passing**	**Job Mix Tol. %**
2 in	100	-	100	-	-		-	-	-	-	-	-
1 ½ in	90-100	-	75-100	±7	100	-	-	-	-	-	-	-
1 in	78-95	±5	55-80	±8	95-100	-	-	-	100	-	-	-
½ in	57-84	±6	23-42	±7	70-90	±6	-	-	95-100	-	100	-
¼ in	40-72	±7	5-20	±6	48-74	±7	100	-	65-85	±7	90-100	
1/8 in	26-57	±7	2-15	±4	32-62	±7	80-100	±6	36-65	±7	45-70	±6
No. 20	12-36	±7	-	-	15-39	±7	32-72	±7	15-39	±7	15-40	±7
No. 40	8-25	±7	-	-	8-27	±7	18-52	±7	8-27	±7	8-27	±7
No. 80	4-16	±4	-	-	4-16	±4	7-26	±4	4-16	±4	4-16	±4
No. 200	2-8	±2	-	-	2-8	±2	2-12	±2	2-6	±2	2-6	±2
PGB Content %[2]	4.0-6.0	0.4	2.5-4.5	0.4	4.5-6.5	0.4	7.0-9.5	0.4	5.4-7.0	NA	5.7-8.0	NA
Mixing &5 Placing Temp. Range, ºF	250-325		225-300		250-325		250-325		250-325		250-325	
Description and Typical Uses	Dense Base: For general use		Open Base: For permeable base layer		Dense Binder: Intermediate layer for general use		Shim: Fine HMA mixture for shimming ruts and leveling		Top Course: Dense course for single course resurfacing of rural, suburban, and urban roadways			

1. All aggregate percentages are based on the total weight of the aggregate.
2. The asphalt content is based on the total weight of the mix. When using slag aggregates in the mix, increase the PGB content accordingly, a minimum of 25% for an all slag mix.
3. 6F2, 6F3, 7F2, 7F3 mix types require friction coarse aggregates, and are required for mainline driving surface courses.
4. For Type 6 and Type 7 (F9) aggregate requirements, Marshall design will not be required. These mix types are suitable where the State's requirements for f9 aggregate apply.
5. Introduce the PG Binder into the pug mill between 225ºF and 350ºF, or as recommended by the PG Binder supplier.

PART 3 – EXECUTION

3.01 PREPARATION

A. In preparation for overlay Contractor shall repair existing pavement in accordance with Section 320117.

B. Contractor shall mill existing perimeter pavement not receiving overlay down to allow for a smooth consistent transition at intersections where new pavement meets old pavement. The milling shall be a minimum of 2'-0" wide.

C. Contractor shall mill existing pavement around the perimeter of storm water inlets as required to maintain existing storm water runoff patterns.

D. After repairing and cleaning of existing asphalt pavement contractor shall tack coat the entire asphalt area to receive asphalt overlay as described in Section 321216 – Part 3 – Execution.

3.02 CONDITIONS FOR PLACEMENT OF ASPHALTIC MATERIALS

A. Weather – Seasonal Limitations

1. The mixing and place of hot-mix asphalt shall be performed only when weather conditions are suitable. When pools of water are observed on the base, mixing and placing of hot-mix asphalt shall not be permitted. The temperature of the surface on which hot-mix asphalt is placed shall be as per Table 402-2.

2. Bituminous concrete pavement placed between November 30th and April 1st shall be subject to the following conditions and regulations:

   a. Approval of the Engineer.
   b. Compliance with Table 402-2 below.
   c. Acceptance of full responsibility by the Contractor for all work so placed.
   d. Providing for such guarantees and deposits as are required by Town regulations.
   e. Guarantee of all work so placed for a period extending up to one year. A notification from the Engineer before the end of the last month of the calendar year following shall be deemed to be within the period of guarantee.

TABLE 402-2 TEMPERATURE AND SEASONAL REQUIREMENTS

Nominal Compacted Lift Thickness	Surface Temperature (Minimum (Note 1)	Seasonal Limits
≤ 1 in.	50ºF	(Notes 2 & 3)
1 in.<Thickness ≤ 3 in.	45ºF	(Notes 2 & 3)
>3 in.	40ºF	None

NOTES:

1. Measure all temperatures on the surface where the mixture is to be placed and the controlling temperature will be the average of three temperature readings taken at locations a minimum of 25 ft apart.
2. Unless otherwise authorized place Top Course only during the period of April 1st up to and including November 30th in the counties of Dutchess, Orange, Rockland, Putnam, Westchester, Nassau, Suffolk, and the City of New York.
3. Unless otherwise authorized place Top Course only during the period of April 15th up to and including October 31st in all counties except as required in Note 2.

3.03 SPREADING AND FINISHING OF HMA

A. Lay the mixture upon an approved clean, tack coated surface. The only exception to this is the surface of permeable base courses. Spread and strike off to the established grade and elevation. Use HMA paver(s) to distribute the mixture either over the entire width or over such partial width as may be practicable. Upon arrival at the site, the trucks will dump the mixture into the paver. Immediately spread and strike off to the required width and appropriate loose depth to obtain the required compacted thickness at completion of the work.

B. When the initial pavement course is laid with automatic HMA pavers, guide the paver by a taut reference line positioned at or near the pavement centerline or edge. Erect and maintain the reference line. Support the reference line at approximately 25 foot intervals on tangent sections and at closer intervals on curves. Tension the line sufficiently to remove any sags. A moving reference of at least 30 ft. in length in lieu of a reference line may be used. The moving reference may be a floating beam, ski, or other suitable type such that the resulting pavement layer surface

is sufficiently even. A short ski or shoe may also be used for the initial course if a satisfactory fixed reference such as a curb, gutter, or other fixed reference is adjacent to the pavement. When the proposed floating beam or the short ski does not produce the results similar to those obtained using a taut reference line, do not use these devices.

C. Place subsequent pavement courses over the initial course using one of the above methods. In addition, any course in an adjacent lane may be used as the reference for the use of a short ski.

D. The automatic screed controls will not be required where existing grades at roadway intersection or drainage structure must be met, for shoulders, temporary detours, behind curbs, or in other areas where its use is impractical.

E. If there are less than 1500 square yards in the Contract, or the areas to be paved are small and scattered, the HMA mixture may be spread by hand methods. For these areas, dump and spread the mixture such that the compacted thickness meets the specified thickness in the plans.

F. Prior to the beginning of rolling, check the loose mat, adjust any irregularities, and remove and replace all unsatisfactory material.

3.04 COMPACTION OF HMA

A. Immediately after the HMA mixture has been spread, struck off and surface irregularities adjusted, thoroughly and uniformly compact it by rolling. Roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking or shoving. Initially roll all courses with the roller traveling parallel to the centerline of the pavement beginning at each edge and working toward the center. Roll banked curves starting at the low side edge and working toward the super-elevated edge.

B. Correct at once any displacement occurring as a result of reversing the direction of the roller, or from other causes, by the use of rakes and addition of fresh mixture as required. Exercise care in rolling so as not to displace the line and grade of the edges of the HMA mixture. To prevent adhesion of the mixture to the drum(s) and pneumatic tires, keep the drum(s) and the pneumatic tires properly moistened with water or water mixed with small quantities of detergent or other approved material. Any petroleum products or solvents having an adverse effect upon the HMA pavement will not be permitted for use.

C. There shall be no visible defects, such as shallow ruts, ridges, roller marks, cracking, tearing, segregation, or any other irregularities as determined by the Architect, in the pavement when the rolling operation is complete. If these defects are present, correct these defects to the satisfaction of the Architect or remove & replace the pavement at no additional cost.

D. Along forms, curbs, headers, walls and other areas not accessible to the rollers, thoroughly compact the mixture with mechanical tampers. On depressed areas, use a trench roller or a small vibratory roller. Cleated compression strips may also be used under the roller to transmit compression to the depressed area.

E. Remove and replace any mixture that becomes loose and broken, mixed with dirt, or is in any way defective with fresh HMA mixture which shall be compacted to conform with the surrounding area. Correct any area showing an excess or deficiency of HMA material to the satisfaction of the Architect.

F. Compaction shall be per Three Roller Compaction Train

1. Initially roll all HMA mixtures with an approved steel-wheel roller operating in a static mode. Overlap the previous roller passes by one-half the width of the roller.

2. Immediately following the initial rolling, roll the mat with an approved pneumatic rubber-tired roller. A minimum of 3 passes of the rubber-tired roller will be required. One pass is defined as one movement of the roller over any point of the pavement in either direction.

3. Immediately following the intermediate rolling, finish roll the mat with a steel-wheel roller to remove all shallow ruts, ridges, roller marks and other irregularities from the surface.

4. Use this compaction method only when the compacted thickness of the finished mat is 4 inches or less. The roller speeds shall not exceed 3 mph. when paving multiple lanes simultaneously; increase the required number of rollers proportionately for each additional full lane width.

G. The required number of passes listed in Table 403-2, Number of Passes, is recommended and may be increased as necessary to achieve adequate density.

H. Seal joints between overlay and adjacent existing pavement with approved asphalt cement filler. Blot with find aggregate (as per N.Y.S.D.O.T. Section 703-01) if required to prevent tracking the bituminous material over the paved surface.

TABLE 403-2 NUMBER OF PASSES

Pavement Courses	Three Roller Train (Static)	
	Steel Wheel Roller	Pneumatic Roller
Base (Open Graded Each Lift)	4	3
Base (Dense-Graded)	4	3
Binder (Dense-Graded)	2	3
Top (Dense-Graded All Types)	2	3

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321236 – PAVEMENT SEALING

PART 1 – GENERAL

1.01 SCOPE

A. Under this section the Contractor shall seal coat pavement with GSB-88 ready to apply emulsified sealer/binder by Asphalt Systems, Inc. or approved equal.

1.02 RELATED SECTIONS

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321723 – Pavement Markings
D. Section 321723.11 – Pavement Markings (Thermoplastic)
E. Section 321723.12 – Pavement Markings (Pre-formed Reflectorized)

1.03 SUBMISSIONS

A. All submissions shall be made in accordance with section 013300 – Submittal Procedures.

B. Contractor shall submit manufacturer's product data and MSDS sheets.

1.04 QUALITY ASSURANCE

A. Do not apply to wet or damp pavement surfaces. Do not apply during rainy or damp weather, or when rain is anticipated within 8 hours after application is complete. Pavement surface temperatures should be 55ºF and rising before application. Do not apply on extremely windy days.

B. Parking areas with slopes of more than 5% and roadways shall have sand applied at time of application at a rate of 0.3 to 0.7 lbs/sq. yd.

PART 2 – MATERIALS

2.01 EMULSIFIED SEALER BINDER

A. In order to establish a standard of performance and quality, this specification is based on GSB-88 emulsified sealer binder as manufactured by Asphalt Systems Inc. (ASI). This does not preclude the contractor from submitting an "or equal." Coal Tar based sealers will not be accepted.

B. Sealer binder shall be a cationic stabilized emulsion of gilsonite ore and select plasticizers. Storage and handling shall be in accordance with manufacturers requirements

C. **Specifications for GSB-88 Ready-to-Apply are as follows:**

Saybolt Viscosity at 77ºF (25ºC) ASTM 0-244……..10 to 50 seconds
Residue by Distillation, or Evaporation……..28% to 42% min.
Pumping Stability Test (2)……. Pass

D. **Tests on Residue from Distillation, or Evaporation:**

Viscosity ASTM 275ºF (135ºC) ASTM 0-4402……1750 cts max.

Solubility in 1,1,1 trichloroethylene ASTM 0-2042……...97.5% min
Penetration ASTM 0-5……50 dmm max.
Asphaltenes ASTM 0-2007……15% min.
Saturates ASTM 0-2007……15% max.
Polar Compounds ASTM 0-2007……..25% min.
Aromatics ASTM 0-2007……15% min.

1. pH **may** be used in lieu of the particle charge test which is sometimes inconclusive in slow setting, bituminous emulsions.

2. Pumping stability is tested by pumping 1 pint, (475 ml) of GSB-88 diluted 1 part concentrate to 1 part water, at 77ºF (25ºC), through a ¼ inch gear pump operating 1750 rpm for 10 minutes with no significant separation or coagulation.

PART 3 – EXECUTION

3.01 PAVEMENT REPAIR

A. If repair is indicated, Contractor shall repair pavement as per Specifications Section 320117, prior to application of seal coat.

3.02 CLEANING & PREPARING

A. Contractor shall thoroughly clean the entire area to be seal coated. The surface of the area to be seal coated must be free of vegetation, dirt, oil, and other foreign materials.

B. Cover all manhole covers, water boxes, catch basins, and other such utility structures within the area being sealed with plastic or building felt and remove the covers each day.

C. The Contractor shall select the materials and equipment for cleaning and preparing pavement surfaces.

D. When the work is conducted under traffic, the Contractor shall supply all necessary flags, markers, signs, and other devices to maintain and protect traffic.

E. Whenever grinding, water blasting, dry sandblasting or other operations are performed, the work shall be conducted in such a matter that the finished pavement surface is not damaged or left in a pattern that will mislead or misdirect the motorist.

F. When removal and cleaning operations are complete, the Contractor shall first power broom and then blow off with compressed air the pavement to remove residue and debris resulting from the cleaning work.

G. The Contractor shall conduct removal and cleaning work in such a manner as to minimize airborne dust, and similar debris so as to prevent a hazard to motor vehicle operation or nuisance to property.

H. Care shall be taken to prevent damage to transverse and longitudinal joint sealers.

I. Cleaning and surface preparation work shall be confined to the surface of existing pavement markings that are specified for removal on the plans or as directed by the Architect.

J. Pavement markings shall be cleaned to the extent that 95% to 100% of the existing marking is removed. Removal operations shall be conducted in such a manner that no more than moderate color and/or surface texture change results on the surrounding pavement surface.

3.03 APPLICATION OF SEAL COAT ON SURFACES

A. Application of seal coating over surfaces that were recently patched will need to be done 15 days after patch was complete to allow asphalt to cure. New paved surfaces will require at least 30 days of cure time prior to seal coating.

B. Apply seal coating in a uniform manner to provide a constant, adherent coating. For bidding purposes; base on application rate of 0.15 gals/sy, one coat.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321413.19 – PERMEABLE PRE-CAST CONCRETE UNIT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Permeable interlocking concrete paver units.

B. Crushed stone bedding material.

C. Open-graded subbase aggregate.

D. Open-graded base aggregate.

E. Bedding and joint/opening filler materials.

F. Geotextiles.

1.02 RELATED REQUIREMENTS

A. Section 033000 – Cast-In-Place Concrete
B. Section 310000 – Earthwork - Preparation of subsoil for pavers
C. Section 321723 – Pavement Markings
D. Section 321540 – Crushed Stone Surfacing

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. C 67, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
2. C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
4. C 140, Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8 – Freezing and Thawing.
5. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
6. C 936, Standard Specification for Solid Interlocking Concrete Pavers.
7. C 979, Specification for Pigments for Integrally Colored Concrete.
8. D 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
9. D 1557, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and 18 in. (457 mm) drop.
10. D 1883, Test Method for California Bearing Ratio of Laboratory-Compacted Soils.
11. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual.

1.04 SUBMITTALS

A. See Section 013300 – Submittal Procedures.

B. Manufacturer's drawing and details: Indicate perimeter conditions, junction with other materials, expansion and control joints, paver [layout,] [patterns,] [color arrangement,] installation [and setting] details. Indicate layout, pattern, and relationship of paving joints to fixtures and project formed details.

C. Minimum 3 lb samples of subbase, base and bedding aggregate materials.

D. Sieve analysis of aggregates for subbase, base and bedding materials per ASTM C 136.

E. Soils report indicating density test reports, classification, and infiltration rate measured on-site under compacted conditions, and suitability for the intended project.

F. Erosion and sediment control plan.

G. Permeable Pavers:

1. Manufacturer's product catalog sheets with specifications.

2. [One] representative full-size samples of each paver type, thickness, color, and finish. Submit samples indicating the range of color expected in the finished installation.

3. Accepted samples become the standard of acceptance for the work of this Section.

4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C 936.

5. Manufacturer's material safety data sheets for the safe handling of the specified materials and products.

6. Manufacturer's written quality control procedures including representative samples of production record keeping that ensure conformance of paving products to the project specifications.

H. Paver Installation Subcontractor:

1. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

2. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

3. Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.

1.05 QUALITY ASSURANCE

A. Paver Installation Subcontractor Qualifications:

1. Utilize an installer having successfully completed concrete paver installation similar in design, material and extent indicated on this project.

2. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Regulatory Requirements and Approvals:

C. Review the manufacturers' quality control plan, paver installation subcontractor's Method Statement and Quality Control Plan with pre-construction meeting of representatives from the manufacturer, paver installation subcontractor, general contractor, engineer and/or owner's representative.

D. Mock-Ups:

1. Install a 5 ft x 5 ft paver area.

2. Use this area to determine surcharge of the bedding layer, joint sizes, lines, laying pattern(s), color(s) and texture of the job.

3. This area will be used as the standard by which the work will be judged.

4. Subject to acceptance by owner, mock-up may be retained as part of finished work.

5. If mock-up is not retained, remove and properly dispose of mock-up.

1.06 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.

3. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction.

D. Storage and Protection: Store materials in protected area such that they are kept free from mud, dirt, and other foreign materials.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install in rain or snow.

B. Do not install frozen bedding materials

1.08 MAINTENANCE

A. Extra materials: Provide 25 units of additional material for use by owner for maintenance and repair.

B. Pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Permeable interlocking concrete pavement (PICP) shall be Eco-Ridge™ permeable pavers as manufactured by Nicolock, Lindenhurst, NY, (631) 669-0700, www.nicolock.com, or Architect written approved equal.

B. PICP shall conform to ASTM C 936, Standard Specification for Solid Interlocking Concrete Pavers and the ICPI, Interlocking Concrete Pavement Institute.

C. PICP units shall meet the following architectural requirements:

1. Color of PICP units shall be as selected by the Architect. Color selection by Architect shall be from the full line of manufacturer's standard colors/blends.

2. Paving pattern shall be as determined by the Architect.

3. Finish of PICP units shall be a profiled finish texture.

4. PICP units shall be of straight geometry and shall have a constant height of 3 1/8". Length and width of paver type(s) as indicated on the drawings or as directed by the Architect. Bond/installation of PCIP units shall be as indicated on the drawings or as directed by the Architect.

5. PICP units shall have tabs which shall create ½" gaps when installed properly. All gaps shall be ADA compliant and provide a minimum of a 15% surface area opening.

6. All PICP units shall be sound and free of cracks or other defects that would interfere with the proper placing of the units or significantly impair the strength or permanence of the construction. Cracking or chipping shall be grounds for rejection.

7. PICP units shall be treated with an integral color protection system.

D. Stone filler, bedding, base and subbase stone shall be in accordance with the following:

1. Crushed stone with 90% fractured faces, LA Abrasion <40 per ASTM C131, minimum CBR of 80% per ASTM D 1883.

2. Do not use rounded gravel.

3. All stone materials shall be washed with less than 1% passing the No. 200 sieve.

4. Joint/Opening filler, bedding base and subbase shall conform to ASTM D 448 gradation as shown in the following tables:

Table 1

ASTM No. 8 Grading Requirements

Bedding and Joint/Opening Filler

Sieve Size	Percent Passing
1/2 in.	100
3/8 in.	85 to 100

No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

Table 2

ASTM No. 57 Open Graded Course

Grading Requirements

Sieve Size	Percent Passing
1 1/2 in.	100
1 in.	95 to 100
1/2 in.	25 to 60
No. 4	0 to 10
No. 8	0 to 5

Table 3

ASTM No. 2 Base Course

Grading Requirements

Sieve Size	Percent Passing
3 in.	100
2 1/2 in.	90 to 100
2 in.	35 to70
1 1/2 in.	0 to 15
3/4 in.	0 to 5

E. Geotextile filter fabric shall be in accordance with the details on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavate areas to receive PICP to proposed sub-grade elevations.

B. Compact the sub-grade and place the geotextile filter cloth in the bottom of the excavation, beneath the No. 2 stone sub-base course.

C. Install, moisten and compact the No. 2 and No. 57 stone bases course to the depths as indicated on the drawings or as ordered by the Engineer. Both stone courses shall be compacted to 95% minimum dry density, in accordance with ASTM D 4254.

D. The surface tolerance for the No. 8 stone shall be +/- 1/8” over a 10-foot straight edge.

E. Moisten, spread and screed the No. 8 bedding stone. Do not permit any pedestrian or vehicle traffic before paving unit installation begins.

F. Lay the pavers (PICP) in the approved pattern maintaining the 1/2" joint spacing.

G. Fill all gaps at the edges of the paved areas with cut units. Cut pavers subject to vehicle traffic

shall be no smaller than 1/3 the whole unit.

H. Fill all joints (openings) with No. 8 stone and sweep excess stone from pavers.

I. Compact and seat the pavers using a low amplitude plate compactor capable of at least 4,000 lbs centrifugal compaction force.

J. Add additional No.8 stone and re-compact as necessary to complete the installation.

K. The surface tolerance for the finish PICP installation shall be 1/8" over a 10-foot straight edge.

L. Clean all surfaces upon completion of the pavement installation.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321413.29 – CONCRETE GRID PAVEMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete grid units.
2. Bedding sand.
3. Edge restraints.
4. Geotextiles.
5. Topsoil and grass for the grid openings.
6. Open-graded aggregate for the grid openings.
7. Open-graded aggregate bedding course.

1.02 RELATED WORK

A. Section 310000 – Earthwork

B. Section 329200 – Turf and Grasses

1.03 REFERENCES

A. American Society of Testing Materials (ASTM):

1. C 33, Specification for Concrete Aggregates.
2. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
3. C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units.
4. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
5. C 1319, Standard Specification for Concrete Grid Paving Units.
6. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft3 (600 kN-m/m3)).
7. D 2940, Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
8. D 5268, Specification for Topsoil Used for Landscaping Purposes.
9. Interlocking Concrete Pavement Institute (ICPI) - Tech Spec 8-Concrete Grid Pavement.

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 and as modified below.

B. Manufacturer's drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, expansion/control joints, paving slab layout and installation details.

C. Sieve analysis per ASTM C 136 for grading of bedding and base materials.

D. Source and content of topsoil and grass seed [sod].

E. Concrete grid units:

1. Two representative full-size samples of each grid type, thickness, color, finish that indicate the extremes of color variation and texture expected in the finished installation.

2. Test results from an independent testing laboratory for compliance of grid paving unit requirements to ASTM C 1319.
3. Manufacturer's catalog literature, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

1.05 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:

1. Engage an experienced installer who has successfully completed grid pavement installations similar in design, material, and extent indicated for this Project.
2. Hold a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Mock-up:

1. Locate where directed by the Architect.
2. Notify Architect in advance of dates when mock-ups will be erected.
3. Install minimum [36] square feet of concrete grid units.
4. Use this area to determine the quality of workmanship in to be produced in the final unit of Work including surcharge of the bedding sand layer, joint sizes, lines, pavement laying pattern(s), color(s), and texture.
5. This area shall be used as the standard by which the work is judged.
6. Subject to acceptance by the owner, mock up may be retained as part of the finished work.
7. If mock up is not retained, installer shall remove and properly dispose of mock up.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Deliver concrete grid units to the site in steel banded, plastic banded, or plastic wrapped packaging capable of transfer by forklift or clamp lift. Unload grids at job site in such a manner that no damage occurs to the product or existing construction.

C. Cover sand with waterproof covering to prevent exposure to rainfall or removal by wind. Secure the covering in place.

D. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

1.07 ENVIRONMENTAL CONDITIONS

A. Do not install bedding materials or grid units during rain or snowfall.

B. Do not install bedding materials and grid units over frozen base materials.

C. Do not install frozen bedding materials.

PART 2 – PRODUCTS

2.01 CONCRETE GRID UNITS

A. Manufacturer: Nicolock Paving Stones & Retaining Walls, or Architect approved equal.

B. Concrete grid paver units, including the following:

1. Grid unit type: Turfstone

    a. Comply with material standards set forth in ASTM C 1319.
    b. Standard Color: Pewter.

2. Size: Turf Paver: nominally 24 inches x 16 inches x 3-1/8 inches thick

2.02 BEDDING MATERIALS

A. General – Sieved per ASTM C 136.

B. Bedding Sand (Concrete Sand)

1. Washed, clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter, frozen lumps, and other deleterious substances.
2. Conforming to the grading requirements in Table 1 below.
3. Do not use limestone screenings.

TABLE 1
Grading Requirements for Bedding Sand
ASTM C33

Sieve Size	Percent Passing
3/8”	100
No. 4	95 to 100
No. 8	85 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	0 to 30
No. 100	2 to 10

- OR - Washed, open-graded stone conforming to the grading requirements in Table 2 below.

TABLE 2
Gradation for Fill or Bedding Course
ASTM No. 8

Sieve Size	Percent Passing
1/2”	100
3/8”	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

2.03 FILL MATERIALS FOR GRID OPENINGS

A. Topsoil: Conform to ASTM D 5268 and Section 329200.

OR

B. Open-graded aggregate. (57 Stone)

C. Conforming to the gradation requirements in Table 2. Do not use gravel.

TABLE 3
Gradation for Dense-Graded, Crushed Stone Base
ASTM D 2940

Sieve Size	Percent Passing
2”	100
1-1/2”	95 to 100
3/4”	70 to 92
3/8”	50 to 70
No. 4	35 to 55
No. 30	12 to 25
No. 200	0 to 8

2.04 EDGE RESTRAINTS

A. Provide edge restraints installed around the perimeter of all concrete grid paving unit areas.

1. Refer to plans for manufacturer and details.

2.05 ACCESSORIES

A. Provide accessory materials as follows:

1. Geotextile fabric: Mirafi 140N

PART 3 – EXECUTION

3.01 EXAMINATION

A. Acceptance of site verification conditions:

1. Contractor shall inspect, accept and verify in writing to the grid installation subcontractor that site conditions meet specifications for the following items prior to installation of bedding materials and concrete grid units:

    a. Verify that drainage and subgrade preparation, compacted density and elevations conform to specified requirements.
    b. Verify that geotextiles, if applicable, have been placed according to drawing and specifications.
    c. Verify that base materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
    d. Provide written density test results for the soil subgrade, base materials to the Owner, Contractor, and grid installation subcontractor.

2. Do not proceed with installation of bedding materials and concrete grids until [subgrade soil and] base conditions are corrected by the Contractor or designated subcontractor.

3.02 PREPARATION

A. Verify that base is dry, certified by Contractor as meeting material, installation and grade specifications and is ready to support sand, edge restraints, grids and imposed loads.

B. Edge Restraint Preparation:

1. Install edge restraints per the drawings and manufacturer's recommendations.

2. Mount directly to finished base. Do not install on bedding sand.

3. The minimum distance from the outside edge of the base to the spikes shall be equal to the thickness of the base.

3.03 INSTALLATION

A. Spread the base sand or stone evenly over the compacted, dense-graded base course and screed uniformly to ½ to 1 in.

B. Ensure the grid units are free from foreign materials before installation.

C. Lay the grid units on the bedding sand in the pattern shown on the drawings. Maintain straight joint lines.

D. Joints between the grids shall not exceed 3⁄16 in.

E. Fill gaps at the edges of the paved area with cut grid pavers or edge units.

F. Cut grid pavers to be placed along the edge with a double-bladed splitter or masonry saw.

G. Sweep topsoil or stone into the joints and openings until full.

H. Sweep the grid surface clear prior to compacting.

I. Compact and seat the grids into the screeded base using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs. (18 kN) centrifugal compaction force. Use rollers or a rubber or neoprene pad between the compactor and grids to prevent cracking or chipping. Do not compact within 6 ft of the unrestrained edges of the grid units.

J. All work to within 6 ft of the laying face must be left fully compacted at the completion of each day.

K. Broadcast grass seed at the rate recommended by seed source or place sod plugs into openings. Add topsoil to the surface to cover the seeds.

L. Remove excess material on the grid surface when the job is complete.

M. Water the entire area. Do not traffic pavement for 30days, if seeded.

3.04 FIELD QUALITY CONTROL

A. After removal of excess top soil/aggregate, check final elevations for conformance to the drawings. Allow 1⁄8 to 1⁄4 in. above specified surface elevations to compensate for minor settlement.

B. The final surface tolerance from grade elevations shall not deviate more than ± 3⁄8 in. over a 10 ft straightedge.

C. The surface elevation of grid units shall be 1⁄8 to 1⁄4 in. above adjacent drainage inlets, concrete collars or channels.

D. Lippage: No greater than 1⁄8 in. difference in height between adjacent grid units.

3.05 PROTECTION

A. After work in the section is complete, the Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321540 – CRUSHED STONE SURFACING

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish and install stone screenings blend for warning tracks in accordance with the plans, specifications and directions of the Engineer.

1.02 RELATED WORK OF OTHER SECTIONS

A. Section 033000 – Cast-in-Place Concrete
B. Section 310000 – Earthwork
C. Section 310001 – Site Work General Provisions
D. Section 329200 – Turf and Grasses

PART 2 – PRODUCTS

2.01 MATERIALS

A. Stone screenings shall be a well-graded bluestone, or limestone, crusher run screenings conforming to the following sizes and matching the existing on-site material.

Screen Size	Percent Passing
¼"	100%
#20	15 - 35%
#200	5 - 8%

PART 3 – EXECUTION

3.01 GENERAL

A. Finished grade shall be crowned from center or pitched in the direction required with a maximum slope of ¼ inch per foot side to side as shown on the plans. There shall be no standing water on any paved surface constructed as part of this project. Upon flooding or significant rain event, any areas found to hold water or wash out shall be corrected to the satisfaction of the Engineer.

B. Perimeter edges of compacted screenings blend areas outside of ballfields shall be formed with 2" x 6", 0.40 PCF, CCA #2 SYP, left in place in accordance with the plans. Inside ballfield areas, the warning tracks shall be formed in accordance with Section 02360. All forms inside ballfield areas shall be removed upon acceptance of project.

C. Screenings shall be installed over 6" depth minimum compacted select fill to the thickness specified. The final compacted thickness shall not be less than four (4) inches.

D. The screenings shall be spread evenly and thoroughly rolled with an approved roller weighing not less than 5 tons, until thorough consolidation is obtained. All depressions shall be filled with screenings and the process of rolling and filling shall continue until a thoroughly compacted uniform surface, satisfactory to the Engineer, is produced. (No segregation of large or fine materials will be permitted, but the screenings as spread shall be well graded with no pockets of fine material.)

Screenings shall be sprinkled with water, at times and in the amounts necessary, to provide consolidation.

3.02 SAMPLES AND TESTING

A. The Contractor shall submit representative samples of the screenings material, with a certified report from an approved testing laboratory stating the results of an analysis of the same material for the approval of the Engineer. The analysis shall include particle size, shape, and a comparison with the material specification.

B. Each batch delivered to the site shall be subject to the approval of the Engineer. The Engineer retains the right to reject all samples either prior to or after testing is complete. Contractor should submit samples for approval prior to testing. Cost of testing shall be the responsibility of the Contractor. Testing shall be approved by the Engineer.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321640 – GRANITE CURBS

PART 1 – GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Section 310000 – Earthwork

1.02 SUBMITTALS

A. Samples:

1. Granite Curb: Minimum one (1) foot long section.

2. Supplier and source.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Stone: Granite shall be tough, dense, sound and durable, of uniform light color, reasonably fine grained and free from seams, cracks or other structural defects.

B. Granite Curbs:

1. Furnish curbs with sawed top, split face and ends. Straight pieces shall be a minimum of 3 feet long. Curb segments on curves with radius of 100 feet or less shall be shaped to the required curvature, with the ends split on radial lines.

2. Indicated dimensions for curb segments shall not vary more than 2 inches for depth and 1 inch for width.

3. Top and front surfaces shall be true planes at right angles to each other, as seen with a straight edge. No projection greater than 3/4 inch or depression greater than 1/2 inch on the split surfaces will be acceptable. Top surface shall not vary more than 1/8 inch.

4. Drill holes will not be permitted in exposed curb surfaces.

C. Dry Concrete: One part Portland cement mixed with six parts DOT No. 1A coarse aggregate dry mix.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Set curbs true to line and grade on a foundation of one cubic foot of dry concrete for each linear foot of curb installed. Fill voids to completely support entire length of curb.

B. Butt joint curb sections together, tight.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321723 – PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Under this work, the Contractor shall furnish and apply pavement marking paint at locations in accordance with the patterns indicated on the plans or as directed by the Architect, and in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and these specifications.

B. This work shall also include the cleaning and preparation of pavement surfaces and the maintenance and protection of traffic markings during marking operations.

1.02 REFERENCE STANDARDS

A. New York State Department of Transportation (NYSDOT)

B. Manual on Uniform Traffic Control Devices (MUTCD)

C. New York State Department of Environmental Conservation (NYSDEC)

D. United States Environmental Protection Agency (USEPA)

1.03 RELATED SECTIONS

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321216.11 – Asphalt Overlay

1.04 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures, and as modified below.

B. Contractor shall submit manufacturer's product data and color samples for every type of paint that is being used. Data shall include application rate, product characteristics, performance characteristics, composition information and product description.

C. For each paint being used, submit material safety data sheets.

PART 2 – MATERIALS

2.01 MATERIALS

A. For purposes of establishing a standard of quality, traffic paint shall be Sherwin-Williams Company Baltimore, MD Hotline® Fast Dry Latex Waterborne Traffic Marking Paint - TM2152 (white), TM2153 (yellow), TM2221 (black), TM2222 (red), TM2224 (blue) and TM2226 (green), or Architect approved equal. Any paint on the NYSDOT approved list for pavement marking materials may be permitted as an equivalent with Architects approval.

B. All paints shall conform to Federal, State, and local air pollution regulations including those for the control (emission) of volatile organic compounds (VOC) as established by the USEPA and the NYSDEC.

PART 3 – EXECUTION

3.01 APPLICATION CONDITIONS

A. At the time of paint application, the pavement surface and ambient temperature shall not be less than 50ºF, the relative humidity shall not exceed 85% and the pavement surface shall be cured and dry.

B. Traffic paint shall not be applied during periods of rain or if the rain is imminent. Waterborne traffic paint shall not be applied if rain is expected within 4 hours after application.

C. Paint shall be applied in strict accordance with the manufacturer's recommendations for use. In no case shall the paint be heated above 150ºF.

D. The Contractor shall be responsible for cleaning the pavement of dust, dirt and other foreign material which may be detrimental to the adhesion of the paint film in accordance with the manufacturer's requirements and to the satisfaction of the Owner and Architect.

3.02 APPLICATION

A. All pavement markings and patterns shall be applied in accordance with manufacturer's instructions and placed as shown in the Contract Documents. Installation shall also be in accordance with the MUTCD and the NYS Uniform Code and shall be as follows:

1. Parking stall stripes shall be 4" wide white except handicapped stalls and access aisles which shall be 4" wide blue.

    a. Uniform symbol of accessibility shall be blue.

    b. Hatching for handicap access aisles shall be 8" wide blue and set 3ft. on center.

    c. Hatching for other non-handicap areas as shown on the plans shall be 8" wide white and set at 3ft. on center.

2. Crosswalks shall have 8" wide white stripes at borders with 12" wide white lines perpendicular to boards and set 3ft. on center.

3. Stop lines shall be 2ft. wide white stripe.

4. Barrier lines shall be 4" wide yellow.

5. Edge of lane lines shall be 4" wide white stripes.

6. Directional arrows, letters, etc. shall be color and size as depicted on plans.

7. GC shall contact the local Fire Marshall and provide fire zone markings as required.

B. Certain products may require thermoplastic markings for certain specific components. If required, this will be indicated on the drawings.

C. When pavement markings are applied under traffic, the Contractor shall provide all the necessary flags, signs, cones, shadow vehicles, flashing arrow boards, etc. to maintain and protect traffic, to

protect the work operation, and to protect the painted pavement markings until thoroughly dry and serviceable.

D. The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of the normal flow of traffic shall not be allowed.

E. The painted pavement markings shall be uniformly applied to the pavement surface at a 15 mil wet film thickness or as per manufacturer's recommendation. The applied pavement markings shall have clean-cut edges and true and smooth alignment.

F. The Contractor shall repair and or replace any markings damaged during the performance of the work.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321723.11 – PAVEMENT MARKINGS (Thermoplastic)

PART 1 – GENERAL

1.01 GENERAL

A. All Division 01 Requirements and Supplementary General Conditions apply to the work of this section.

1.02 SCOPE

A. Under this work, the contractor shall furnish and apply primer and Thermoplastic Reflectorized Pavement Markings at the locations and in accordance with the patterns indicated on the plans and in conformance with the Manual of Uniform Traffic Control Devices (MUTCD), latest N.Y.S. D.O.T. standard specifications US edition and these specifications.

B. In lieu of thermoplastic marking compound for stop lines, crosswalk lines, letters and symbols, preformed reflectorized pavement markings will be accepted. See Section 321723.12.

1.03 RELATED SECTIONS

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321216.11 – Asphalt Overlay
D. Section 321723 – Pavement Markings
E. Section 321723.12 – Pavement Markings (Pre-formed Reflectorized)

1.04 SUBMISSIONS

A. All submissions shall be made in accordance with Section 013300 – Submittal Procedures.

B. Submit manufacturer's product data for all products specified herein.

C. Submit copy of N.Y.S. D.O.T. approved materials list found on the N.Y.S. D.O.T. website.

PART 2 – MATERIALS

2.01 GENERAL

A. Materials may be obtained from any manufacturer off of the N.Y.S.D.O.T. approved materials list for extruded Thermoplastic and glass beads or spheres.

2.02 EXTRUDED THERMOPLASTIC

A. Materials shall conform to the following:

1. Formulated for application at temperatures greater than 400ºF.

2. Show no significant breakdown of deterioration at 475ºF

3. Pigment, beads and filler uniformly dispersed in the binder resin.

4. Be free from all skins, dirt and foreign objects.

5. Comply with the following requirements:

MATERIAL PROPERTIES		
Component	**% by weight**	
	White	**Yellow**
Binder	17.0 min	17.0 min
Titanium Dioxide	10.0 min	-
Reflective Beads	30 – 40	30 – 40
Calcium Carbonate & Inert Fillers	43.0 max	*
Yellow Pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers at the option of the manufacturer, providing the other composition requirements of this specification are met and the yellow pigment is lead free.

6. Physical Properties

   a. Color (ASTM D1535) when viewed under north standard daylight:
   White: approximate visual match to Munsell Book Notation 10YR8/14.
   Yellow: approximate visual match to Munsell book notation N9.5/0.

   b. Yellowness index (ASTM D1925 at 2º observer angle (illuminate) white thermoplastic: 0.12 maximum.

   c. Softening point (ASTM E28) softening point: 194ºF min.

   d. Specific gravity between 1.8 and 2.2 as determined by a water displacement method at 77ºF.

   e. Field drying time at 70ºF, and thickness between 1/8 and 3/16 inch: completely solid and showing no damaging effect from traffic after ten (10) minutes.

2.03 GLASS BEADS FOR PAVEMENT MARKING

A. Material Requirements:

1. Composed of glass that is highly resistant to traffic wear and to the effects of weathering.

2. Be colorless, clean, transparent, free from milkiness or excessive air bubbles, and essentially free from surface scarring or scratching.

3. Silica content (ASTM C169): 60% minimum

4. Refractive index: 1.50 when tested by the liquid immersion method at 77ºF.

5. Show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps.

6. Flow freely from the dispensing equipment at any time when surface and atmospheric conditions are satisfactory and painting.

B. Sphericty – (ASTM D1155 Procedure A) Spherical in shape – 70% minimal, true spheres. Wet/Night Visibility Beads shall be tested for roundness according to the procedural directives of the N.Y.S.D.O.T. Materials Bureau.

C. Gradation (ASTM D1214):

TABLE 727-05-1 GLASS SPHERE GRADATION (Standard Bead)				
Percent Passing by Weight				
Marking Type	Sieve Size			
	#20	#30	#50	#80
Epoxy	100	80-95	9-42	0-10
Traffic Paint	100	80-95	9-42	0-10
Thermoplastic	100	79-95	15-60	0-15

TABLE 727-05-2 GLASS SPHERE GRADATION (Standard Bead)						
Percent Passing by Weight						
Marking Type	Sieve Size					
	#10	#12	#14	#16	#18	#20
Epoxy Wet/Night Reflective	100	95-100	75-95	10-47	0-7	0-2

D. Coating:

TABLE 727-05-3 GLASS SPHERE COATINGS	
Marking Type	Coating Type
Epoxy (Wet/Night Visibility Bead)	Silane Type adherence coating designed to interact with and adhere to epoxy pavement markings.
Epoxy (Standard Bead)	Moisture-resistant coating or a dual purpose type coating (moisture-resistant and adherence)
Traffic Paint	
Thermoplastic (Drop on)	

E. Moisture Resistance:

1. Place two pounds of spheres in a washed cotton bag, having a thread count of approximately 50 per square inch (warp and woof) and immerse the bag in a container of water for 30 seconds. Remove the bag and force excess water from the sample by squeezing the bag. Suspend and allow to drain for two hours at room temperature (73ºF ± 3ºF). Then, mix the sample in the bag by shaking thoroughly. Transfer sample slowly to a clean, dry glass funnel having a stem 4 inches in length, with a 3/8 inch stem entrance inside diameter opening and a minimum exit opening of ¼ inch. The entire sample shall flow freely through the funnel without stoppage. When first introduced into the funnel, if the spheres clog, it is permissible to lightly tap the funnel to initial the flow.

F. Basis of Acceptance:

1. Glass Beads for Pavement Markings will be accepted on the basis of the product appearing on the Approved List and that it conforms to this specification.

2.04 THERMOPLASTIC PRIMER

A. Thermoplastic primer shall be specifically designed to enhance the bond of thermoplastic pavement markings to Hot Mixed Asphalt and/or Portland Cement Concrete pavements.

B. It shall be either a one component or two component, cold or hot-applied material of the type recommended by the manufacturer.

C. It shall conform to current Federal, State and Local air pollution regulations, including those for the control (emissions) of Volatile Organic Compounds (VOC) as established by the U.S. E.P.A., and the N.Y.S. D.E.C.

D. The type of primer used shall be as recommended by the extruded Thermoplastic manufacturer off of the N.Y.S. D.O.T. approved materials list.

2.05 PACKAGING AND SHIPPING

A. Materials shall be shipped to the job site in strong, substantial containers, clearly marked with the following:

1. Manufacturer's name
2. Name of product
3. Material specification number
4. Lot/batch numbers
5. Manufacture date
6. Expiration date
7. Quantity
8. Two component primer containers clearly identified "Part A" and "Part B" primers accompanied with written instructions for use.

PART 3 – EXECUTION

3.00 GENERAL

A. The thermoplastic pavement marking compound shall be extruded in a molten state onto the pavement surface. Following surface application of glass beads and upon cooling to normal pavement temperatures, the resultant marking shall be adherent Reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic.

3.01 SURFACE CLEANING AND PREPARATION OF PAVEMENT

A. The Contractor shall be responsible for cleaning the pavement surface to the satisfaction of the Architect and in conformance with Section 320117.

B. At the time of application of primer and markings all pavement surfaces shall be free of oil dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item. In addition, concrete curing compounds on new Portland Cement concrete surfaces; and existing pavement markings on both concrete and bituminous pavement surfaces shall be cleaned and primed.

3.02 APPLICATION GENERAL

A. All pavement markings shall be placed as shown on the plans and in accordance with Manual of Uniform Traffic Control Devices.

B. When pavement markings are applied under traffic the Contractor shall provide all necessary flags, markers, signs, etc. to maintain and protect traffic; and to protect marking operations and the markings until thoroughly set.

C. The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow shall not be allowed.

D. The Contractor shall be responsible for removing, to the satisfaction of the Architect, tracking marks, spilled thermoplastic or thermoplastic applied in unauthorized areas.

E. When necessary, the Contractor shall establish marking line points at 30 feet intervals throughout the length of pavement or as directed by the Architect.

3.03 ATMOSPHERIC CONDITIONS

A. Thermoplastic pavement markings shall be placed upon dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 55ºF and the ambient temperatures shall be a minimum of 50ºF and rising.

B. To comply with the 55ºF pavement surface temperature requirement, it will benefit the Contractor to schedule striping work for seasons of warm weather when possible. In cooler conditions, striping operations may be coordinated with bituminous paving work to take advantage of residual heat, providing that the ambient temperature requirements of (A) above are still met.

3.04 MATERIALS APPLICATION REQUIREMENTS

A. Thermoplastic Primer

1. All pavement surfaces shall be primed except that on new bituminous pavements, when the thermoplastic pavement markings are applied within the same calendar year as the completion of paving operations, primer shall not be required.

2. The primer shall be either a one-component or a two-component, cold or hot applied material of the type recommended by the manufacturer of the thermoplastic pavement marking material.

3. The application of the primer shall be performed in accordance with the manufacturer's written recommendations which shall include the method of application, the application rate, and the drying time.

B. Thermoplastic Composition

1. Application Temperature

a. Thermoplastic composition shall be applied at temperatures no lower than 400ºF at the point of deposition. For purposes of these specifications, the point of deposition shall be defined as within the extrusion shoe.

2. Extruded Markings

a. All extruded markings shall be applied at the specified width, and at a thickness of not less than 1/8 inch nor more than 3/16 inch.

C. Reflective Glass Spheres (for Drop-On)

1. Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 lb. per 20 square feet of composition.

3.05 APPLICATION OF THERMOPLASTIC PAVEMENT MARKINGS

A. All special markings, cross walks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator. Unless otherwise specified in the Contract Documents all center line, skip line, edge line and other longitudinal type markings may be applied with either a portable or a mobile applicator.

B. When the surface preparation work has been completed, if applicable, the bituminous and/or concrete pavement surface shall be primed according to the manufacturer's written instructions. Primer shall not be required on new bituminous pavement surfaces that are completed within the same calendar year as the thermoplastic marking application. The primer shall be spray applied onto the pavement surface and allowed to dry according to the manufacturer's written instructions. Pavement surfaces that are primed and not striped with thermoplastic within the required drying time or within the same work day shall be re-primed.

C. After the primer has dried, the thermoplastic shall be applied at composition of temperatures no lower than 400ºF at the point of deposition. Immediately after installation of the thermoplastic, drop-on reflective glass spheres shall be mechanically applied such that the spheres are held by and embedded in the surface of the molten composition.

3.06 METHOD AND EQUIPMENT

A. Thermoplastic material shall be applied to the pavement surface by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for maintaining the temperature and controlling the flow of material.

B. For heating the thermoplastic composition, the application equipment shall include a melting kettle(s) of such capacity as to allow for continuous marking operations. The melting kettle may be mounted on a separate "supply" vehicle or included as part of the mobile applicating equipment. The kettle shall be capable of heating the thermoplastic composition at temperatures greater than 400ºF. The heating mechanism shall be by means of a thermostatically controlled heat transfer medium. Heating of the composition by direct flame will not be allowed. Material temperature gauges shall be visible at both ends of the kettle.

C. The applicating equipment shall be constructed as to insure continuous uniformity in the dimensions of the strip. The applicator shall provide a means of cleanly cutting of stripe ends squarely and shall provide a method of applying "skip" lines. The equipment shall be capable of applying varying widths of traffic markings.

D. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated in such a manner that it will only dispense beads while the composition is being applied.

E. Applicating equipment shall be mobile and maneuverable to the extend that straight lines can be followed and normal curves can be made in a true arc.

F. Applicators shall be equipped and constructed in such a manner as to satisfy the requirements of the National Board of Fire Underwriters and the appropriate agencies of the State of New York. The equipment used for the placement of thermoplastic pavement marking shall be two general types:

1. Mobile applicator

    a. The mobile applicator shall be defined as a truck mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by the extrusion method.

The unit shall be equipped to apply the thermoplastic material at temperature exceeding 400ºF, and that the widths and thicknesses specified herein. The mobile unit shall be capable of operating continuously and of installing a minimum of 20,000 feet of longitudinal markings in an 8-hour day.

b. The mobile unit shall be equipped with a melting kettle(s) or materials storage reservoirs of such capacity as to allow for continuous marking operations. The kettle or reservoirs shall be capable of heating or holding the thermoplastic composition at temperatures greater than 400ºF.

c. The mobile unit shall be equipped with an extrusion shoes(s), and shall be capable of marking edge line and centerline stripes. The extrusion shoe(s) shall be closed, heat jacketed or suitably insulated unit; shall hold the molten thermoplastic at a temperature greater than 400ºF; and shall be capable of extruding a line between 3 to 8 inches in width; and at a thickness of not less than 1/8 inch nor more than 3/16 inch, and of generally uniform cross section. Material temperature gauges shall be affixed or incorporated in the extrusion shoe in such a manner as to be visible, and capable of monitoring the composition temperature throughout the marking operation.

d. The mobile unit shall be equipped with an electronic programmable line pattern control system, or mechanical control system, so as to be capable of applying skip or solid lines in any sequence, and through any extrusion shoe in any cycle length.

2. Portable applicator

a. The portable applicator shall be defined as hand operated equipment, specifically designed for placing thermoplastic installations such as crosswalks; stop bars; legends; arrows; and short lengths of lane, edge, and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. It is intended that the portable applicator will be loaded with hot thermoplastic composition from the melting kettle(s). The portable applicator shall be equipped with all the necessary components, including a material storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at temperatures greater than 400ºF, of extruding a line of from 3 to 8 inches in width, and in thickness of not less than 1/8 inch nor more than 3/16 inch and of generally uniform cross-section. Material temperature gauges shall be affixed or incorporated in the extrusion shoe in such a manner as to be visible, and capable of monitoring the composition temperature throughout the marking operation.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321723.12 – PAVEMENT MARKINGS (Pre-formed Reflectorized)

PART 1 – GENERAL

1.01 SCOPE

A. Under this work, the contractor shall furnish and apply preformed Reflectorized pavement markings at the location and in accordance with the patterns indicated on the plans or as ordered by the Architect, and in conformance with the Manual of Uniform Traffic Control Devices (MUTCD), and these specifications. The preformed reflectorized pavement marking shall be applied on new and existing bituminous and Portland Cement concrete surfaces by hand and mechanical methods. The resultant marking shall be an adherent reflectorized stripe that is capable of molding itself to the contours of the pavement surface and resisting deformation by traffic.

1.02 RELATED SECTION

A. Section 320117 – Pavement Repair and Resurfacing
B. Section 321216 – Asphalt Paving
C. Section 321216.11 – Asphalt Overlay
D. Section 321236 – Asphalt Sealing
E. Section 321723 – Pavement Markings
F. Section 321723.11 – Pavement Markings (Thermoplastic)

PART 2 – MATERIALS

2.01 GENERAL

A. Permanent pavement tape shall be designed to provide immediate and continuous retroreflection.

B. Meet all requirements of ASTM D4505

C. Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.

D. Have a layer of reflective beads bonded to, or embedded in the top surface.

E. Be pre-coated, on its bottom side, with a pressure-sensitive adhesive for adherence to Hot Mix Asphalt or Portland Cement Concrete surfaces.

F. Be of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects.

G. Be weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.

H. Be capable of molding itself to the contours, breaks and faults of Hot Mix Asphalt or Portland Cement Concrete surfaces.

I. Show no significant tearing, rollback, lifting or other signs of poor adhesion.

J. Be free from dirt and any other containments.

2.02 PREFORMED PAVEMENT MARKING TAPE

A. Unless otherwise noted all samples are to be prepared and tested at an ambient temperature of 73ºF ± 3ºF.

B. Color (ASTM D1535) When viewed under North Standard Daylight:

1. White: Approximate visual color match to Munsell Book Notation N 9.5/0.

2. Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14.

C. Thickness – Preformed pavement marking tape shall be:

1. Uniform Cross Section:	60 mils minimum thickness
2. Patterned (Variable Cross Section):	20 mils minimum thickness at the thinnest portions 60 mils minimum thickness at the thickest portions

3. The patterned top surface shall have approximately 50% of the surface area raised, and its design shall provide immediate and continuing retroflection.

D. Tensile Strength (ASTM D638) – 40 psi minimum

1. Test specimens shall be Type II prepared by die cutting with Die C as specified in ASTM D412, Test Method A. The testing machine shall operate at a speed of 0.2 inches per minute. For calculating the tensile strength of patterned type material, the thickness measurements shall be taken in the thinnest portions of the cross sectional area.

E. Elongation (ASTM D638) – When tested in accordance with the conditions as specified for.

1. Tensile Strength: 15% minimum elongation

2.03 PRIMER

A. If recommended by the manufacturer of the permanent tape, primer shall be compatible with the marking and surface the marking is being applied to.

B. The primer shall be specifically designed to enhance the bond of the permanent tape to HMA and/or PCC pavements.

C. Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

2.04 PACKAGING AND SHIPPING

A. Materials shall be shipped to the job site in strong, substantial containers, clearly marked with the following and including:

1. Manufacturer’s Name
2. Name of Product
3. Material Specification Number
4. Lot/Batch Number
5. Manufacture Date
6. Quantity

7. Primers accompanied with written instructions for use
8. Expiration Date

PART 3 – APPLICATION

3.01 APPLICATION GENERAL

A. General

1. All pavement markings and patterns shall be placed as shown on the plans and in accordance with MUTCD.

2. When pavement markings are applied under traffic, the Contractor shall supply all necessary flags, markers, signs, and other devices, to maintain traffic and to protect the markings until set.

3. The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow will not be allowed without prior approval of the Architect.

4. The Contractor shall be responsible for removing, to the satisfaction of the Architect, preformed markings applied in unauthorized areas.

3.02 WEATHER AND SEASONAL LIMITATIONS

A. Preformed pavement markings shall be placed upon dry pavement surfaces; pavements exposed to rain or wet conditions shall be allowed to thoroughly dry before marking application.

B. Preformed markings applied, on completed pavements, shall be applied within the seasonal limitations of Table 688-1. The pavement surface and ambient air temperatures Table 688-1 shall in all cases be the controlling temperature at which performed markings are placed. Marking application work shall be discontinued when temperatures fall below the specified requirements.

TABLE 688-1 TEMPERATURE SEASONAL REQUIREMENTS (3.03 ON COMPLETED PAVEMENTS)

Geographic Location	Pavement Surface Temperature	Ambient Air Temperature	Allowable Installation Dates
Regions 1, 2, 3, 4, 5, 6, 7 & 9 (All Counties) Region 8 (Ulster County only)	70ºF, Min.	60Fº, Min.	May 15 to September 1
Regions 8 & 10 (except Ulster County)	70ºF, Min.	60Fº, Min.	May 15 to September 15
Region 11	70ºF, Min.	60Fº, Min.	May 1 to September 15

NOTES:
1. Surface temperatures shall be measured on the pavement surface where the preformed markings are to be placed. The controlling temperature shall be the average of three temperature readings taken at locations 100± feet apart.
2. Ambient air temperatures shall be measured in the shade.

3.03 MECHANICAL APPLICATING EQUIPMENT

A. Mechanical applicating equipment for the placement of preformed pavement marking stripes shall be of the type recommended by the manufacturer of the preformed material.

3.04 ROLLERS

A. Preformed markings applied in conjunction with this section, On Completed Pavements, shall be rolled into place using steel shell or pneumatic rubber-tire roller equipment. Steel wheel rollers shall weigh a minimum of 200lbs on each axle. Pneumatic rubber-tired rollers shall exert a minimum tire compression on the pavement of 28 psi. Hand rollers or rubber tired vehicles (e.g. pick-up truck) meeting the above requirements may be suitable for use. During bituminous paving operations shall be rolled into place with compaction equipment meeting requirements described below:

   1. Rollers – all rollers shall be static steel wheel type, or pneumatic tire type. All rollers shall be in good mechanical condition, free from excessive backlash, and capable of operating at speeds slow enough to avoid displacement.

B. Static Steel-Wheel Rollers – shall be self-propelled and be either 10 to 12 ton tandem three axle type or 8 to 10 ton tandem two axle type.

C. Pneumatic Rubber-Tired Rollers – shall be self-propelled and consist of two axles on which multiple pneumatic-tired wheels are mounted in such a manner that the rear wheels shall not follow in the tracks of the forward wheels and will be spaced to give essentially uniform coverage with each pass. The axles will be mounted in a rigid frame provided with means for adding ballast. The wheels shall be mounted so as to oscillate individually or in pairs. The tires must be smooth and show no tread pattern, be uniformly inflated. Pneumatic rollers shall meet the following requirements unless otherwise approved:

   1. Maximum Wheel Load: 5,600 lbs.
   2. Tire Compression on Pavement: 80 ± 5 psi
   3. Maximum Axle Load: 22,400 lbs.

3.05 PRIMER REQUIREMENTS

A. When required by the preformed marking material manufacturer, primer or adhesive shall be used for marking applications in accordance with the written recommendations of the manufacturer of the preformed marking material.

B. Primer materials shall be placed at the application rate and by the application methods recommended by the manufacturer.

C. When primer is applied, the area of application shall be at least the width or dimension, of the new preformed marking, plus one inch on each side.

3.06 SURFACE CLEANING AND PREPARATION OF PAVEMENT SURFACES

A. The Contractor shall be responsible for cleaning the pavement surface to the satisfaction of the Architect.

B. Surface cleaning and preparation work shall be performed only in the area of the preformed markings application.

C. At the time of application, all pavement surfaces shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item. In addition, concrete curing compounds on new Portland cement concrete surfaces and

existing pavement markings on both concrete and bituminous pavement surfaces shall be removed under this pay item.

3.07 APPLICATION OF PREFORMED REFLECTORIZED PAVEMENT MARKINGS

A. Unless otherwise approved by the Architect, all longitudinal lines shall be applied using mechanical applicating equipment. Transverse and special marking patterns may be applied by hand or mechanical methods.

B. Preformed marking operations shall not begin until after the finish railing is complete and pavement surface has been cleaned and prepared.

C. Preformed stripes shall not be applied over longitudinal paving joints or over the point of transition between the pavement surface and adjoining shoulder. The placement of stripes in the area of transition shall be either on the pavement or on the shoulder, as directed by the Architect.

D. No roller shall operate in excess of 3.0 mph. One roller pass shall be defined as one movement of the roller over any point of the preformed marking, in the direction of the marking application.

1. Application on Completed Pavements

a. The application of preformed markings shall only be performed within the limitations of §3.02 Weather and Seasonal Limitations.

b. If required by the manufacturer, primer and adhesive activators shall be applied and allowed to dry in accordance with the instructions of the manufacturer of the preformed material.

c. The preformed marking shall be placed on the pavement surface and adhered by rolling. Rollers shall make a minimum of one pass, and operate in the same direction that the marking was applied. Diagonal, reverse or crosswise rolling will not be allowed. The minimum one pass may be increased if required.

3.08 INSPECTION

A. The preformed pavement markings will be inspected by the architect during and following installation to determine conformance with this specification. In addition, they will be inspected following a performance period that will extend for 180 calendar days following both their installation and opening of the roadway or parking lot to traffic.

B. Within 15 consecutive calendar days after the end of the 180 day performance period, a final performance inspection will be made by the Architect. If this inspection discloses any work, in whole or part, as not being visibly intact and serviceable to the following extent, the Contractor shall completely repair or replace such work:

1. Channelizing Line, Stop Line, Crosswalk Lines, Clearance Line, and Crossbars, Hatch Lines, Letters and Symbols.

a. 90 percent by area of any individual line, letter or symbol.

b. When required all repair or replacement work shall be performed in accordance with his specification and completed within 60 calendar days. The Architect shall determine the limits or quantity of preformed to be repaired or replaced.

c. Upon completion of the final performance inspection, or after satisfactory completion of any necessary corrections, the Architect will, within 10 calendar days, notify the Contractor in

writing, of the date of such final performance inspection and release the Contractor from further performance responsibility.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 322700 – SITE FURNISHINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 01, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

A. Provide labor, materials, and equipment necessary for complete installation of the following items as shown on the Drawings and specified herein. Work under this Section includes, but is not limited to, the following:

1. Flagpole.
2. Benches and bike racks.
3. Tree grates.

B. Related Work Specified Elsewhere:

1. Section 033000 – Cast-In-Place Concrete
2. Section 310000 – Earthwork
3. Section 099000 – Painting

C. Refer to the Bid Proposal Form for Alternates that may affect the Work of this Section.

1.03 SYSTEM DESCRIPTION

A. Accessibility Requirements:

1. Provide site improvements to conform with the Americans with Disabilities Act Accessibilities Guidelines (ADAAG) and State and Local Regulations. These requirements supercede Technical Specifications in this section.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's current product literature for each manufactured product specified herein.

B. Submit shop drawings for items included in this Section. Include types of materials, construction details, sizes and layout, and complete information on hardware and accessories.

1.05 QUALITY ASSURANCE

A. Preliminary Coordination Conference: As soon as possible after award of site improvement work, meet with Installer, and installers of substrate construction and other related work including penetrating work such as playground equipment, the Architect, and the Owner.

1. Review requirements (Contract Documents), submittals, status of coordinating work, availability of materials, and installation facilities and establish preliminary installation schedule. Review requirements for inspections, tests, certifications, forecasted weather conditions, governing regulations, and proposed installation procedures.

PART 2 - PRODUCTS

2.01 ACCEPTABLE STANDARDS

A. Where a model number is used on the Drawings, it refers to the manufacturer and product listed which is specified as the type, size, function, and quality required for this Project.

B. The Architect will consider for acceptance products of other manufacturers provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval must be accompanied by the “Substitution Request Form” and complete technical data for evaluation. All materials for evaluation must be received by the Architect at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

1. Refer to the Instruction To Bidders and Substitution Request Form for additional requirements.

2.02 FLAGPOLE

A. Commercial Groundset Flagpole: As manufactured by Pole-Tec Co., Inc., East Setauket, New York, (800) 633-6733; or Architect approved equal.

1. Shall be cone tapered aluminum of machine made 6063-T6 seamless extruded aluminum tubing with a minimum wall thickness of .188 inch.

2. The flagpole is to be ground set with a 44 foot overall length, with exposed height 40 feet with 8 inch outside butt diameter and 3-1/2 inch outside top diameter.

3. Finish shall be a satin brush finish duranodic coating. Provide same color finish on exposed metal components and accessories.

4. Flagpole is to have an internal halyard system, standard spun aluminum flash collar.

2.03 BENCHES AND BIKE RACKS

A. Benches shall be Model C #B962416 as manufactured by Pavestone. Finish shall be exposed aggregate. Quantities shall be as indicated on C5.1, 5.2, and 5.3. Website is www.pavestone.com.

B. Bicycle racks shall be provided (location per Owner), Model GR112 as manufactured by Madrax, (800) 448-7931. Color shall be per Architect from manufacturer’s standard range.

2.04 TREE GRATES

A. Tree Grates: Model number as indicated. Manufactured by Neenah Foundry Co.; phone 1-414/725-7000.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Flagpole: Install per manufacturer's instructions.

B. Install new benches in strict accordance with manufacturer's recommendations and as located on the plans.

C. Install tree grate as shown on Drawings.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 323113 – VINYL COATED CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 01, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

A. The work includes all labor, materials, equipment, and appliances necessary to furnish and install the various height chain link fences and gates as shown on the plans, detailed in the specifications, and directed by and to the approval of the District.

1.03 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete
B. Section 310000 – Earthwork
C. Section 310001 – Site Work General Provisions
D. Section 329200 – Turf and Grasses

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 and as modified below.

B. Manufacturer's Data:

1. Submit copies of manufacturer's product data, specifications, installation instructions, and copy of manufacturer’s warranty.

C. Shop Drawings: Layout of items with dimensions, details, recommended footing details, finishes of components, and accessories.

PART 2 - MATERIALS

2.01 FENCE MATERIALS

A. Fabric: The fabric shall have knuckled edges at the top and bottom and shall be fastened to the top rail, and bottom rail when provided, which shall be run through loop caps.

1. PVC coating bonded and thermally fused to metallic coated steel core wire: ASTM F668 Class 2b, 7 mil thickness. Core wire tensile strength 75,000 psi. 2" diamond mesh, 9-gauge core wire with a diameter of 0.148" and a breakload of 1,290 lbs except where noted differently on the plans.

B. Posts: Line, terminal (corner and end), and gate posts shall be a minimum of 3'-8" greater in length than the fabric height in order to be embedded in 3'-6" deep concrete footings.

1. Line Posts: Line posts shall be 2.5 inch O.D. steel pipe, weight 3.65 lbs. per foot, copper bearing and hot dip galvanized; PVC-Coated finish in accordance with ASTM F1043;

supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. Complete with all necessary fittings.

2. Terminal Posts: End and corner posts shall be 3.0-inch O.D. steel pipe, weight 5.79 lbs. per foot, copper bearing and hot-dip galvanized; PVC-Coated finish in accordance with ASTM F1043; supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. Complete with all necessary fittings.

3. Gate Posts: Gate posts shall be copper bearing steel, hot-dip galvanized; PVC-Coated finish in accordance with ASTM F1043; supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. Complete with all necessary fittings. Conforming to the following sizes, except where noted differently on the plans:

   a. Gate leaf up to 3 ft. wide: Schedule 40, 2.875" o.d., 5.79 lbs. per lineal foot.

   b. Gate leaf over 3 ft. to 5 ft. wide: Schedule 40, 4.0" o.d., 9.10 lbs. per lineal foot.

   c. Gate leaf over 5 ft. to 10 ft. wide: Schedule 40, 6.625" o.d., 18.97 lbs. per lineal foot.

C. Gates: Gate frames shall be 2.0-inch O.D., copper bearing fabric to match the fence line. All frames shall be hot-dipped, galvanized 1.8 oz. zinc/s.f. uncoated surface, conforming to ASTM 120, Schedule 40. PVC-Coated finish in accordance with ASTM F1043; supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. All gates to be provided with necessary hinges and gate padlock fittings. Provide diagonal bracing when gate leafs are over 4'-0" wide.

D. Bracing: Braces not less than 1 5/8-inch O.D., weighing not less than 2.27 lbs. per foot, or approved equivalent section, complete with 3/8-inch galvanized truss rod and turnbuckle, all PVC coated, shall be installed at all corner, end, and gate posts, and as required at changes of vertical grade.

E. Post Tops: All posts shall be fitted with heavy malleable iron or pressed steel tops, PVC coated. Tops shall permit passage of top rails.

F. Bottom Rail: Bottom shall be 1 5/8-inch O.D., copper bearing steel pipe, hot-dipped, galvanized, weight 2.27 lbs. per foot. PVC-Coated finish in accordance with ASTM F1043; supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. Bottom rail shall be installed between posts with appropriate fittings and accessories.

G. Top Rail: Top rail shall be 1 5/8-inch O.D., copper bearing steel pipe, hot-dipped, galvanized, weight 2.27 lbs. per foot. PVC-Coated finish in accordance with ASTM F1043; supplemental color coating of 10-15 mils of thermally fused PVC in color as selected by the Architect. Top rail shall pass through the line post tops and form a continuous brace from end to end of each run of fence. Couplings shall be outside sleeve type and at least seven inches long; one coupling every five shall contain a heavy spring to take up expansion and contraction of the top rail.

H. Truss Rods: Galvanized steel rods, 5/16" min. diameter.

I. Tension (stretcher) bars: one piece lengths 2" shorter than fabric height, 3/16" x 3/4", hot dip galvanized, PVC coated.

J. Wire ties and clips: 9-gauge galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12 1/2 gauge for attachment of fabric to tension wire. All PVC coated

K. Nuts and bolts are galvanized but not vinyl coated. Utilize PVC paint color coat nuts and bolts.

L. Fence Post Footings:

1. The line, corner, and end gate posts shall be as detailed on the plans. All concrete footings shall be 3,000 psi., air-entrained. Footings shall be crowned to shed water and protect posts at ground line.

a. If footings are not detailed on plans, they shall be provided with a diameter 4 times greater than the outside dimension of post, 3'-6" deep, or deeper as the post condition warrants.

2.02 TENNIS COURT WINDSCREEN

A. Provide tennis court windscreens at full perimeter of tennis courts if the work of this section is related to tennis court construction as indicated on the drawings.

1. Manufacturer: Douglas Industries, Eldridge, Iowa.

a. Model: VCP-9 Windscreen

2. Fabric:

a. Open mesh vinyl-coated (50%) polyester with 70% windbreak, 320 x 200 tensile strength, 9 x 12 inch weave, 7 oz. per square yard. Color as selected by Architect.

b. 3 ply hems, vinyl coated polyester reinforced and double sewn with heavy duty polyester thread.

c. No. 2 brass grommets.

d. Douglas AVR reinforced, die-cut, heat sealed air vents.

3. Fasteners:

a. Lightweight, self-locking plastic fasteners with 150lb. break strength, C-snaps, and lacing cord.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.02 CHAIN LINK FENCE FRAMING INSTALLATION

A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.

B. Concrete Set Posts: Drill hole in firm, undisturbed earth to approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

1. Line posts shall be spaced at uniformly at approximately 8 ft. o.c., maximum of 10'-0" o.c., unless otherwise noted.

2. Terminal posts shall be located at each fence termination and change in horizontal or vertical direction of 30 degrees or more.

    a. Install horizontal pipe brace at mid-height for fences 6’ and taller, at first section on each side of terminal, corner, and gate posts. Firmly attach with appropriate fittings. Install diagonal truss rods at these points. Install braces and adjust truss rod, ensuring posts remain plumb.

C. Check each post for vertical and top alignment and maintain in position during placement and finishing operation.

D. Rails: Continuous top rails in 21 ft. sections. Bottom and mid rails (if required), single lengths between posts.

    1. Install mid-rails for fabric heights of 10 ft. and over.

E. Gates: Install gates plumb, level and secure for full opening without interference. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation.

3.03 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric on secure side and attach so that fabric remains in tension after pulling force is released. Leave approximately 1" between finish grade and bottom selvage. Attach fabric with 9 ga. galvanized PVC coated wire ties or clip to line posts at 12" on center and to rails, braces, and tension wire at 12" on center.

B. Tension (stretcher) bars): Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands spaced maximum of 15" on center.

3.04 ACCESSORIES

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on fence side opposite fabric side for added security.

3.05 CLEANING

A. Clean up debris and unused material and remove from site.

3.06 RESTORATION

A. Any areas of the project site that are disturbed by the work shall be restored to the condition in which they existed prior to this work.

B. Grass areas disturbed by this work shall be restored with topsoil & seed.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 323114 – GALVANIZED CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 01, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

A. The work includes all labor, materials, equipment, and appliances necessary to furnish and install the various height chain link fences and gates as shown on the plans, detailed in the specifications, and directed by and to the approval of the District.

1.03 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete
B. Section 310000 – Earthwork
C. Section 310001 – Site Work General Provisions
D. Section 329200 – Turf and Grasses

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 and as modified below.

B. Manufacturer's Data:

1. Submit copies of manufacturer's product data, specifications, installation instructions, and copy of manufacturer’s warranty.

C. Shop Drawings: Layout of items with dimensions, details, recommended footing details, finishes of components, and accessories.

PART 2 - MATERIALS

2.01 FENCE MATERIALS

A. Fabric: The fabric shall have knuckled edges at the top and bottom and shall be fastened to the top rail, and bottom rail when provided, which shall be run through loop caps.

1. Galvanized steel fabric shall be hot-dipped, galvanized mesh and framework, 2.0-ox. zinc/s.f. of uncoated surface, conforming to A.A.S.H.T.O. M181-74, Type 1; mesh shall be two- inch No. 9 wire (0.148-inch diameter), except where noted differently on the plans.

B. Posts: Line, terminal (corner and end), and gate posts shall be a minimum of 3'-8" greater in length than the fabric height in order to be embedded in 3'-6" deep concrete footings.

1. Line Posts: Line posts shall be 2.5 inch O.D. steel pipe, weight 3.65 lbs. per foot, copper bearing and hot dip galvanized, complete with all necessary fittings.

2. Terminal Posts: End and corner posts shall be 3.0-inch O.D. steel pipe, weight 5.79 lbs. per foot, copper bearing and hot-dip galvanized, complete with all necessary fittings.

3. Gate Posts: Gate posts shall be copper bearing steel, hot-dip galvanized, conforming to the following sizes, except where noted differently on the plans:

    a. Gate leaf up to 3 ft. wide: Schedule 40, 2.875" o.d., 5.79 lbs. per lineal foot.

    b. Gate leaf over 3 ft. to 5 ft. wide: Schedule 40, 4.0" o.d., 9.10 lbs. per lineal foot.

    c. Gate leaf over 5 ft. to 10 ft. wide: Schedule 40, 6.625" o.d., 18.97 lbs. per lineal foot.

C. Gates: Gate frames shall be 2.0-inch O.D., copper bearing fabric to match the fence line. All frames shall be hot-dipped, galvanized 1.8 oz. zinc/s.f. uncoated surface, conforming to ASTM 120, Schedule 40. All gates to be provided with necessary hinges and gate padlock fittings. Provide diagonal bracing when gate leafs are over 4'-0" wide.

D. Bracing: Braces not less than 1 5/8-inch O.D., weighing not less than 2.27 lbs. per foot, or approved equivalent section, complete with 3/8-inch galvanized truss rod and turnbuckle, all PVC coated, shall be installed at all corner, end, and gate posts, and as required at changes of vertical grade.

E. Post Tops: All posts shall be fitted with heavy malleable iron or pressed steel tops, PVC coated. Tops shall permit passage of top rails.

F. Bottom Rail: Bottom shall be 1 5/8-inch O.D., copper bearing steel pipe, hot-dipped, galvanized, weight 2.27 lbs. per foot. Bottom rail shall be installed between posts with appropriate fittings and accessories.

G. Top Rail: Top rail shall be 1 5/8-inch O.D., copper bearing steel pipe, hot-dipped, galvanized, weight 2.27 lbs. per foot. Top rail shall pass through the line post tops and form a continuous brace from end to end of each run of fence. Couplings shall be outside sleeve type and at least seven inches long; one coupling every five shall contain a heavy spring to take up expansion and contraction of the top rail.

H. Truss Rods: Galvanized steel rods, 5/16" min. diameter.

I. Tension (stretcher) bars: one piece lengths 2" shorter than fabric height, 3/16" x 3/4", hot dip galvanized.

J. Wire ties and clips: 9-gauge galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12 1/2 gauge for attachment of fabric to tension wire.

K. Nuts and bolts are galvanized.

L. Fence Post Footings:

1. The line, corner, and end gate posts shall be as detailed on the plans. All concrete footings shall be 3,000 psi., air-entrained. Footings shall be crowned to shed water and protect posts at ground line.

    a. If footings are not detailed on plans, they shall be provided with a diameter 4 times greater than the outside dimension of post, 3'-6" deep, or deeper as the post condition warrants.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.02 CHAIN LINK FENCE FRAMING INSTALLATION

A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.

B. Concrete Set Posts: Drill hole in firm, undisturbed earth to approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

1. Line posts shall be spaced at uniformly at approximately 8 ft. o.c., maximum of 10’-0” o.c., unless otherwise noted.

2. Terminal posts shall be located at each fence termination and change in horizontal or vertical direction of 30 degrees or more.

a. Install horizontal pipe brace at mid-height for fences 6’ and taller, at first section on each side of terminal, corner, and gate posts. Firmly attach with appropriate fittings. Install diagonal truss rods at these points. Install braces and adjust truss rod, ensuring posts remain plumb.

C. Check each post for vertical and top alignment and maintain in position during placement and finishing operation.

D. Rails: Continuous top rails in 21 ft. sections. Bottom and mid rails (if required), single lengths between posts.

1. Install mid-rails for fabric heights of 10 ft. and over.

E. Gates: Install gates plumb, level and secure for full opening without interference. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation.

3.03 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric on secure side and attach so that fabric remains in tension after pulling force is released. Leave approximately 1" between finish grade and bottom selvage. Attach fabric with 9 ga. galvanized wire ties or clip to line posts at 12" on center and to rails, braces, and tension wire at 12" on center.

B. Tension (stretcher) bars): Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands spaced maximum of 15" on center.

3.04 ACCESSORIES

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on fence side opposite fabric side for added security.

3.05 CLEANING

A. Clean up debris and unused material and remove from site.

3.06 RESTORATION

A. Any areas of the project site that are disturbed by the work shall be restored to the condition in which they existed prior to this work.

B. Grass areas disturbed by this work shall be restored with topsoil & seed.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 323223 – SEGMENTED RETAINING WALLS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work includes furnishing and installing segmental retaining wall (SRW) units to the lines and grades designated on the project's final construction drawings or as directed by the Architect. Also included are furnishing and installing appurtenant materials required for construction of the retaining wall as shown on the construction drawings.

B. The work must comply with the requirements of the following related specifications sections when applicable:

1. Section 033000 – Cast-In-Place Concrete
2. Section 310000 – Earthwork
3. Section 310001 – Site Work General Provisions
4. Section 310002 – Stakeout
5. Section 329200 – Turf and Grasses

1.02 REFERENCE STANDARDS

A. Segmental Retaining Wall Units

1. ASTM C 1372 – Standard Specification for Segmental Retaining Wall Units
2. ASTM C 140 – Standard Test Methods of Sampling and Testing Concrete Masonry Units

B. Geosynthetic Reinforcement

1. ASTM D 4595 – Tensile Properties of Geotextiles by the Wide-Width Strip Method
2. ASTM D 5262 – Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics
3. GRI: GG1 – Single-Rib Geogrid Tensile Strength
4. GRI: GG5 – Geogrid Pullout

C. Soils

1. ASTM D 698 – Moisture Density Relationship for Soils, Standard Method
2. ASTM D 422 – Gradation of Soils
3. ASTM D 424 – Atterberg Limits of Soil

D. Drainage Pipe

1. ASTM D 3034 – Specification for Polyvinyl Chloride (PVC) Plastic Pipe
2. ASTM D 1248 – Specification for Corrugated Plastic Pipe

E. Engineering Design

1. "NCMA Design Manual for Segmental Retaining Walls," Latest Edition

F. Where specifications and reference documents conflict, the Architect shall make the final determination of applicable document. Contractor shall notify Architect of any conflicts prior to proceeding with the work.

1.03 QUALITY ASSURANCE

A. Installation shall be by a contractor and crew with at least five years of experience in placing segmented retaining walls on projects of similar nature or dollar cost.

B. Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.04 SUBMITTALS

A. All submittals shall be in accordance with Specification Section 013300.

B. Product Data: Submit manufacturer's product data for each type of interlocking masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

C. Materials Submittals: The Contractor shall submit manufacturer’s certifications prior to ordering materials stating that the SRW units and geosynthetic reinforcement meet the requirements of Section 2 of this specification.

D. Design Submittal: The Contractor shall submit two sets of detailed design calculations and final retaining wall plans for approval at least two weeks prior to the beginning of wall construction. All calculations and drawings shall be prepared and sealed by a professional Civil Engineer (P.E.) – (Wall Design Engineer) experienced in SRW design and licensed in the state where the wall is to be built.

   1. Not required for unreinforced gravity walls less than 4 feet in height with level backfill, good soils and no excessive loading.

   2. Gravity walls described in Item 1 shall be constructed in accordance with standard practices and manufacturers requirements.

E. Submit physical samples of wall units to indicate color and shape selections. Color will be selected by Architect from manufacturer’s available colors.

F. Submit sieve analysis for grading of bedding and joint sand.

G. Submit test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936. Indicate layout, pattern, and relationship of paving joints to fixtures and project formed details.

H. LEED Submittals: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 – LEED Requirements.

I. Shop Drawings: For the following in addition to 1.04D:

   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

   2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.

   3. Required Reinforcement: (if applicable) Provide details regarding required reinforcement. Show elevations & sections of reinforced walls.

   4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.05 DELIVERY, STORAGE AND HANDLING

A. Contractor shall check materials upon delivery to assure that specified type and grade of materials have been receive and proper color and texture of SRW units have been received.

B. Contractor shall prevent excessive mud, wet concrete, epoxies and like materials that may affix themselves from coming in contact with materials.

C. Contractor shall store and handle materials in accordance with manufacturer's recommendations.

D. Contractor shall protect materials from damage. Damaged materials shall not be incorporated into the retaining wall.

1.06 ENVIRONMENTAL CONDITIONS

A. Do not install work of this section during rain, sleet or snowfall.

B. Do not install work of this section over frozen base materials.

PART 2 – MATERIALS

2.01 SEGMENTAL RETAINING WALL UNITS

A. SRW units shall be machine formed, Portland cement concrete blocks, integrally colored, specifically designed for retaining wall applications. For the purposes of this specification the following product has been utilized as the standard of performance:

1. Alta Pro Wall Retaining Wall Units as manufactured by Nicolock, 612, Muncy Avenue, Lindenhurst, NY 11757, (631) 669-0700. www.nicolock.com.

2. Other manufacturers offering similar products may be provided upon proof of equivalence.

B. Color of SRW shall be selected by Architect from manufacturer standard color range.

C. Finish of SRW units shall be split-face.

D. SRW unit faces shall be of straight geometry.

E. SRW unit height shall be 8 inches and the width shall be 18 inches and have a minimum depth of 12 inches.

F. SRW units (not including aggregate fill in unit voids) shall provide a minimum weight of 105 psf wall face area.

G. SRW units shall be solid through the full depth of the unit.

H. SRW units shall be secured to one another with manufacturers specifically design locking system.

I. SRW units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.

J. SRW units shall be capable of providing overlap of units on each successive course so that wall meeting at corner are interlocked and continuous. SRW units that require corners to be mitered shall not be allowed.

K. SRW units shall be capable of providing a split-face, textured surface for all vertical surfaces that will be exposed after completion of wall, including any exposed sides and backs of units.

L. SRW units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength of permanence of the structure. Cracking or excessive chipping may be grounds for rejection. Units showing cracks longer than ½ inch shall not be used within the wall. Units showing chips visible at a distance of 30 feet from the wall shall not be used within the wall.

M. Concrete used to manufacture SRW units shall have a minimum 28 days compressive strength of 3,000 psi and a maximum moisture absorption rate, by weight, of 8% as determined in accordance with ASTM C1372. Compressive strength test specimens shall conform to the saw-cut coupon provisions of ASTM C140.

N. SRW units' molded dimensions shall not differ more than + 1/8 inch from that specified, in accordance with ASTM C1372.

2.02 GEOSYNTHETIC REINFORCEMENT

A. Geosynthetic reinforcement shall consist of geogrids or geotextiles manufactured as a soil reinforcement element. The manufacturers/suppliers of the geosynthetic reinforcement shall have demonstrated construction of similar size and types of segmental retaining walls on previous projects.

B. The type, strength and placement location of the reinforcing geosynthetic shall be as determined by the Wall Design Engineer, as shown on the final, P.E.-sealed retaining wall plans.

2.03 LEVELING PAD

A. Material for leveling pad shall consist of compacted sand, gravel, or combination thereof (USCS soil types GP, GW, SP, & SW) and shall be a minimum of 6 inches in depth. Lean concrete with a strength of 200-300 psi and 3 inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost SRW unit.

B. Poured-in-Place concrete will be an acceptable leveling pad alternative.

2.04 DRAINAGE AGGREGATE

A. Drainage aggregate shall be angular, clean stone or granular fill meeting the following gradation as determined in accordance with ASTM D422.

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75-100
No. 4	0-60
No. 40	0-50
No. 200	0-5

2.05 DRAINAGE PIPE

A. The drainage collection pipe shall be a perforated or slotted PVC, or corrugated HDPE pipe. The drainage pipe may be wrapped with a geotextile to function as a filter.

B. Drainage pipe shall be manufactured in accordance with ASTM D 3034 and/or ASTM D 1248.

2.06 REINFORCED (INFILL) SOIL

A. The reinforced soil material shall be free of debris. Unless otherwise noted on the final, P.E.-sealed, retaining wall plans prepared by the Wall Design Engineer, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP, SM, meeting the following gradation, as determined in accordance with ASTM D422:

Sieve Size	Percent Passing
4 inch	100
No. 4	20-100
No. 40	0-60
No. 200	0-35

B. The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless expressly approved by the Wall Design Engineer and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger than this maximum.

C. The plasticity of the fine fraction shall be less than 20.

2.07 DESIGN PARAMETERS

A. Soil

1. If sufficient information is not otherwise included within the Contract Documents the Contractor shall provide soil borings, from a Geotechnical Engineer, as required to determine the soil conditions. The soil parameters, shall be determined by the Contractor’s Geotechnical Engineer and shall be used for the preparation of the final design. The cost of the borings and geotechnical engineering shall be included within the bid.

2. Should the actual soil conditions observed during construction differ from those assumed for the design, design shall be reviewed by the Contractor’s Wall Design Engineer at the Contractor’s Geotechnical Engineer's direction. Any additional wall requirements shall be provided by the Contractor at no additional cost.

B. Design

1. The design analysis for the final, P.E.-sealed retaining wall plans prepared by the Contractor’s Wall Design Engineer shall consider the external stability against sliding and overturning, internal stability and facial stability of the reinforced soil mass and shall be in accordance with acceptable engineering practice and these specifications. The internal and external stability analysis shall be performed in accordance with the “NCMA Design Manual for Segmental Retaining Walls,” using the recommended minimum factors of safety in this manual.

2. External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Owner and the Owner's Geotechnical Engineer. Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analysis based on the final wall design provided by the Wall Design Engineer and coordinate any required changes with Wall Design Engineer.

3. While vertical spacing between geogrid layers may vary, it shall not exceed 2.0 feet maximum in the wall design.

4. The geosynthetic placement in the wall design shall have 100% continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.

PART 3 - EXECUTION

3.01 GENERAL

A. General Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

3.02 EXCAVATION

A. Contractor shall excavate to the lines and grades required for proper installation of the wall in coordination with the finished grades indicated in the Construction Documents. General Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted structural infill material, or as directed by the Architect, at the General Contractor's expense.

B. General Contractor shall verify location of existing structures and utilities prior to excavation. General Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor, included in his base bid costs.

3.03 FOUNDATION PREPARATION

A. Following the excavation, the foundation soil shall be examined by the Owner’s material testing agency to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Owner's Engineer.

B. Foundation soil shall be proof-rolled and compacted to 95% standard Proctor density and inspected by the Owner’s material testing agency prior to placement of leveling pad materials.

3.04 LEVELING PAD CONSTRUCTION

A. Leveling pad shall be placed as shown on the Contractors final approved, P.E.-sealed retaining wall plans with a minimum thickness of 6 inches. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost SRW unit.

B. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/4 inch to 1/2 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95% of maximum standard Proctor density (ASTM D 698).

3.05 SRW UNIT INSTALLATION

A. All SRW units shall be installed at the proper elevation and orientation as shown on the Contractor’s final approved, P.E.-sealed wall plans and details or as directed by the Wall Design Engineer. The SRW units shall be installed in general accordance with the manufacturer's recommendations. The specifications and drawings shall govern in any conflict between the two requirements.

B. First course of SRW units shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps

shall be left between the front of adjacent units. Alignment may be done by means of a string line or offset from base line to the back of the units.

C. All excess debris shall be cleaned from top of installed units and the next course of units installed on top of the units below.

D. Prior to placement of next course, the level and alignment of the units shall be checked and corrected where needed.

E. Layout of curves and corners shall be installed in accordance with the wall plan details or in general accordance with SRW manufacturer's installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.

F. Procedures C. through E. shall be repeated until reaching top of wall units, just below the height of the cap units. Geosynthetic reinforcement, drainage materials, and reinforced backfill shall be placed in sequence with unit installation as described in Section 3.06, 3.07 and 3.08.

3.06 GEOSYNTHETIC REINFORCEMENT PLACEMENT

A. All geosynthetic reinforcement shall be installed at the proper elevation and orientation as shown on the Contractor's final approved P.E.-sealed retaining wall plan profiles and details, or as directed by the Wall Design Engineer.

B. At the elevations shown on the final plans, (after the units, drainage material and backfill have been placed to this elevation) the geosynthetic reinforcement shall be laid horizontally on compacted infill and on top of the concrete SRW units, to within 1 inch of the front face of the unit below. Embedment of the geosynthetic in the SRW units shall be consistent with SRW manufacturer's recommendations. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor to be in accordance with the geosynthetic manufacturer's recommendations. The highest-strength direction of the geosynthetic must be perpendicular to the wall face.

C. Geosynthetic reinforcement layers shall be one continuous piece for their entire embedment length. Splicing of the geosynthetic in the design-strength direction (perpendicular to the wall face) shall not be permitted. Along the length of the wall, horizontally adjacent sections of geosynthetic reinforcement shall be butted in a manner to assure 100% coverage parallel to the wall face.

D. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geosynthetic. Turning should be kept to a minimum. Rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds (less than 5 mph).

E. The geosynthetic reinforcement shall be free of wrinkles prior to placement of soil fill. The nominal tension shall be applied to the reinforcement and secured in place with staples, stakes or by hand tensioning until reinforcement is covered by 6 inches of fill.

3.07 DRAINAGE MATERIALS

A. Drainage aggregate shall be installed to the line, grades and sections shown on the Contractor's final approved P.E.-sealed retaining wall plans. Drainage aggregate shall be placed to the minimum thickness shown on the construction plans between and behind units (a minimum of 1 cubic foot for each exposed square foot of wall face unless otherwise noted on the final wall plans).

B. For walls greater than 3 feet in height drainage collection pipes shall be installed to maintain gravity flow of water outside the reinforced-soil zone. The drainage collection pipe shall daylight into a storm sewer or along a slope, at an elevation lower than the lowest point of the pipe within the aggregate drain.

3.08 BACKFILL PLACEMENT

A. The reinforced backfill shall be placed as shown in the approved final wall plans in the maximum compacted lift thickness of 10 inches and shall be compacted to a minimum of 95% of standard Proctor density (ASTM D 698) at a moisture content within 2% of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the SRW units.

B. Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall units. Compaction within the 3 feet behind the wall units shall be achieved by at least three passes of a lightweight mechanical tamper, plate, or roller.

C. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.

D. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

3.09 SRW CAPS

A. SRW caps shall be properly aligned and glued to underlying units with “PL Pro” adhesive, a flexible, high-strength concrete adhesive. Rigid adhesive or mortars are not acceptable.

B. Caps shall overhang the top course of units by 3/4 inch to 1 inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.

3.10 CONSTRUCTION ADJACENT TO COMPLETED WALL

A. The Owners Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

3.11 GUARANTEE

A. The Contractor shall guarantee all materials and workmanship in accordance with the General Conditions and Section 017100.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 328000 – IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. When indicated on the drawings, the Contractor is to provide material and installation of a complete, automatically controlled, underground irrigation system including the following:

1. Piping, backflow preventer, sprinkler heads and nozzles, valves, controllers, control wiring, fittings, electrical connections, connections to mains, and all necessary accessories.

1.02 RELATED REQUIREMENTS

A. Construction drawings.
B. Section 310000 – Earthwork
C. Section 329301 – Plant Maintenance
D. Section 331000 – Water Systems
E. Section 333000 – Sanitary Systems

1.03 SUBMITTALS

A. Submit manufacturer's technical data and installation instructions for underground irrigation system.

B. Submit as-built layout plan and details illustrating the location and type of heads, valves, piping circuits, controls, and accessories.

PART 2 - MATERIALS

2.01 ACCEPTABLE MANUFACTURERS

A. Certain manufacturers' names are used throughout these specifications to denote a standard only. All approved manufacturers' products are acceptable when products of equal or better quality and performance are submitted and approved. Product specifications must be equal to, or better, to qualify as an "or equal" product. In some product categories, there are approved manufacturers other than the ones listed in this section. Any manufacturer listed in the product category only are approved for that listed category only.

1. Rain Bird Sprinkler Manufacturing Corporation.
2. The Toro Company, Irrigation Division.
3. Weathermatic, a division of Telsco Industries.

2.02 MATERIALS

A. Pipe:

1. All main line pipe to circuit control valves shall be rigid PVC Class 200 when the static pressure is less than 100 psi and Schedule 40 when the static pressure is greater than 100 psi conforming to ASTM D 2241.

2. All circuit pipe 3/4" diameter and larger shall be rigid PVC Class 200 conforming to ASTM D

2241.

3. In areas where soil freezing occurs and local installation practices allow, flexible polyethylene (PE) pipe will be accepted as an alternate to rigid PVC pipe. PE pipe shall be SDR-11.5, PE 23, rated at 100 psi, National Sanitation Foundation (NSF) approved, conforming to ASTM D2239.

B. Pipe Fittings:

1. For PVC pipe, ASTM D 2466, socket fittings with ASTM A 2564 solvent cement.

2. For PE pipe, Type 1, PVC insert fittings designed for use with flexible pipe, ASTM D 2609. Pipe and fittings shall be jointed with stainless steel pinch claps or wormgear clamps (including stainless steel screw).

3. For copper tube fittings, provide cast brass or wrought copper, sweat solder type.

C. PVC Sleeves/Water Lines:

1. For water lines shall be rigid PVC Schedule 40 conforming to ASTM D 2241 and be sized as indicated on the drawings.

D. PVC Sleeves/Electrical Lines:

1. For pulling electrical control wire shall be rigid PVC Class 160 conforming to ASTM D 2241 and be sized as indicated on the drawings.

E. Remote Control Valves:

1. The valve shall be a Rain Bird PES Series valve, Toro 252 Series valve, or Weathermatic 11000 CR Series valve.

F. Automatic Sprinkler Controllers:

1. Provide unit capable of controlling the number of stations specified on the plans plus one blank station for future uses and complying with the following:

   a. The controller shall be housed in a UL listed, wall mountable, heavy-duty, key-lock cabinet. The cabinet shall be weatherproof for outdoor installation.
   b. The controller shall have a master valve circuit for use with a master valve to pressurize the system when the irrigation system starts.
   c. The controller shall be a Rain Bird RC-C or RC-AB Series controller; Toro C8+1, C12+1, C24+2, or H300 Series controller; or Weathermatic RM Series controller.

G. Sprinkler Heads:

1. Pop-up Spray Heads:

   a. The sprinkler shall have a matched precipitation rate brass or plastic nozzle with an adjusting screw capable of regulating the radius and flow.
   b. The sprinkler for all turf areas shall be a Rain Bird 1804-SAM-PRS; Toro 570C-4P head with 570 Series pressure compensating nozzles; or Weathermatic 35P head with 400 Series nozzles.
   c. The sprinkler for all shrub/ground cover areas shall be Rain Bird 1812-SAM-PRS; Toro 570C-12P head with pressure compensating nozzle; or Weathermatic 37P head with 400 Series nozzles.

2. Pop-up Rotor Heads:

    a. The sprinkler shall have a matched precipitation rate (MPR) color-coded nozzle with stainless steel screw capable of regulating the radius and the flow.
    b. The sprinkler shall be a Hunter Industries Professional Series G-type sprinkler; Rain Bird R-50 pop-up rotor head; or Toro Super 700 Series sprinklers.

H. Quick Coupling Equipment:

1. Valves:

    a. The quick coupling valve shall be a one-piece type, constructed of heavy cast brass.
    b. The cover shall be a durable, protective self-closing rubber cover.
    c. The quick coupler valve shall be a Rain Bird 3RC quick coupler valve or equal.

2. Keys:

    a. The valve shall be opened and closed by a single lug brass key with a detachable handle of the same manufacturer having a 3/4" inch MNPT.
    b. The quick coupler key shall be a Rain Bird #3 key or equal.

3. Swivel Hose Ell:

    a. The swivel hose ell shall be of heavy bronze construction, connected to the key for hose connections.
    b. The swivel hose ells shall be 3/4-inch FIPT x 3/4-inch Male Hose Threads.
    c. The hose swivel shall be as manufactured by the Rain Bird Sprinkler Manufacturing Company or equal.
    d. Provide a minimum of three ells for entire system.

I. Wire:

1. Provide #16 AWG UP or larger wire to electric remote control valves from the automatic controller. The wire shall be UL approved for direct underground burial.

2. Provide a single wire from the controller to each solenoid valve having insulation any color except white.

3. Provide a common neutral wire to all the solenoid valves from the controller having insulation colored white.

J. Drain Valves:

1. Provide a manual drain valve for the main line piping and a manual drain valve for the piping in each circuit.

    a. The manual drain valve shall be a 3/4 inch or larger brass or plastic ball type valve located at the lowest elevation point in the system or circuit.
    b. The valve shall be piped to a 4 cubic foot gravel drain pit or piped to daylight if adequate fall from the valve to the pipe end can be achieved.
    c. The valve shall be installed in a minimum 6 inch round valve box for easy access.
    d. In climates where the soil consistently freezes 2 inches deep or more each winter, a quick coupler valve shall also be installed just past the backflow preventer to allow for compressed air blowout of the system.

K. Backflow Preventer:

1. The backflow preventer shall be as specified in this section unless local codes allow for a double check valve assembly. The backflow preventer shall:

   a. Be a reduced pressure principle type suitable for supply pressure up to 175 psi and water temperatures up to 180°F.
   b. Have a bronze body construction. It shall utilize silicon rubber for drip tight disc material in the first and second check valves plus the relief valve.
   c. Be constructed with NPT body connections and have ball type test cocks.
   d. Have quarter run, full port, resilient seated bronze ball valve shut-offs.
   e. Consist of a pressure differential relief valve located in a zone between two positive seating check valves.
   f. Have all access ports covers secured with stainless steel screws which are bolted to the valve body.
   g. Have suitable connections for an air gap.
   h. Meet all the requirements of ASSE Standard 1013; AWWA Standard C506, FCCCHR USC Manual, Section 10.
   i. Only RPZ/DCV devices approved by the New York State Health Department will be acceptable. Plans and installation must conform to the Suffolk County Water Authority's Cross Connection Control Booklet.

L. Rainfall Sensor:

1. Provide a rainfall sensor to shut the system off during substantial rainfall. The rainfall sensor shall be Rainbird's Raincheck; Toro's Rainswitch; or Weathermatic's Rain-Stat.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Summary:

1. Stake locations of each sprinkler in accordance with the plans.

2. If discrepancies in the plan become apparent at this time, point out the discrepancy to the Owner's representative.

3. Do not proceed with the work until the necessary design engineering changes have been made and approved by the Owner's representative.

4. Install sprinkler system equipment with necessary hardware in accordance with the drawings and the manufacturer's instructions and as specified herein.

5. Verify system design pressures prior to installation.

B. Pipe Laying:

1. Do not lay pipe on unstable material or blocking, or, when in the opinion of the Owner's representative, conditions are unsuitable.

2. Trench bottom should be continuous, relatively smooth, and free of rocks and rubbish. Where ledge rock, hardpan, or rocky soil is encountered, it is advisable to pad the trench bottom with sand or compacted, fine-grained soils. Wedging or blocking of pipe is not permitted.

3. Minimum of 3" between parallel pipes in the same trench.

4. Hold pipe securely in place while joint is being made.

5. Rest full length of each pipe section firmly on bedding, excavating recesses to accommodate joints.

6. Avoid trench heating electric ducts, storm and sanitary sewer lines, existing water and gas mains, all of which have right-of-way.

7. Maintain a minimum separation of 2' from other utilities parallel to irrigation pipes.

8. Sprinkler sections shall drain to the manual drain valve placed at the low point in the section.

9. Sand or fine-grained soils should be used for cover to a sufficient depth to prevent damage to the pipe from rocks or other debris in backfill during the compacting operation.

10. Minimum cover over mains and control valves is 18" below finish grade.

11. Minimum cover over laterals is 12".

12. Do not cut sidewalk, drives, or curb during trenching for piping.

13. Use PVC sleeves under paved areas where possible; otherwise, auger bore or tunnel. Repair damaged paved surfaces during guarantee period.

14. Cover and protect open pipe ends, fixtures, and equipment from dirt, water, and chemical or mechanical damage during installation.
15. AT completion of work, thoroughly clean fixtures, exposed materials, and equipment.

C. Laying Plastic Pipe:

1. Snake in trench at least 1 foot per every 100 feet to allow for thermal expansion.

2. Socket type fittings: Solvent weld by applying PVC primer to both pipe and fitting. Apply solvent to both pipe and fitting, twisting pipe a minimum of 1/4 turn as pipe is inserted to fitting to insure a uniform coverage of the solvent.

3. Thread type fittings: Virgin liquid teflon lubricant or teflon tape all male thread components.

D. Install Sprinkler Heads:

1. Install pop-up spray heads and pop-up rotary heads flush with finish, settled grade.

2. Place part circle heads no closer than 1 inch from edge of paved areas and no further than 4 inches from edge of paved areas.

3. All sprinkler heads shall be installed with swing joints or Rainbird swing pipe and fittings or Toro funny pipe and fittings to allow for adjustment of the head and finish grade settling.

    a. A swing pipe assembly shall consist of a minimum of 12 inches of swing pipe with fitting adapters at each end threaded into the circuit pipe fitting at one end and into the head at the other end.
    b. A swing joint assembly shall consist of two street ells joined at one end of a 1/2-inch x 12 inch PVC Schedule 80 nipple and one street ell attached to the other end and threaded into the circuit pipe fitting.

E. Wiring:

1. All wire runs should be installed with no splices between the controller and the remote control valves. If splices must be utilized, they should be kept to the minimum number possible.

2. All splices at the control valves shall be installed with appropriate electrical splice connection protection.

3. All splices at locations other than the control valves shall be installed with appropriate electrical splice connection protection and installed in a 6 inch round box for ease of locating.

4. Splices shall be 3M Company, DBY Connectors, or equal.

5. Provide 12" expansion loops in wiring at each wire splice (other than the remote control valve) and at each change of wire direction.

6. Provide a 24" expansion coil for each wire at each remote control valve and where each wire enters the controller conduit. Each 24" expansion coil shall consist of 6' of wire coiled around a 1/2" piece of pipe resulting in a 24" long coil.

7. Control wiring shall be run into the controller in a separate conduit from all power supply wiring and at least 10 inches apart if both are run in the same trench.

F. Setting of Valves:

1. All valves, quick coupler, master and electric remote control shall be located in the landscaped planter areas. In no case shall a valve be located beneath a paved surface.

2. Master and electric remote control valves shall be installed in a level position only.

3. Master and electric remote control valves shall be installed in a minimum 11" x 16" or larger plastic, rectangular, marked valve box. In no case shall more than one electric remote control valve be installed in one box unless a large, 18" x 24" or larger rectangular valve box is used.

4. Quick coupler valves shall be installed in a 6" round plastic valve box with the top of the quick coupler valve as close as possible to finish grade as the valve box installation will allow.

5. A minimum 2 cubic foot gravel pit shall be installed under each master, electric remote control valve, and quick coupler valve with the top surface of the gravel pit at least 2" below the bottom of the valve.

6. A master valve shall be installed immediately after the backflow preventer to allow pressurization of the irrigation system only when the controller cycles to operation the irrigation stations. The master valve shall be the same size as the main line as indicated on the irrigation plans. The master valve shall be energized by the master valve circuit located in the controller.

G. Sleeving:

1. Furnish and install PVC sleeving where control wires or pipe pass under paved surfaces as follows:

    a. Of adequate size to allow retrieval for repair.
    b. Extend 12" beyond the end of paving at each end.
    c. Have a 4" bed of sand backfill above pipe.
    d. Have a minimum of 30" of cover from finish grade.
    e. Install permanent bench mark in curb for reference to all sleeve locations.

3.02 TEST AND FLUSHING

A. Following installation, make final adjustments of lawn irrigation system preparatory to Owner's representative's final inspection:

1. Flush system completely to remove debris, with nozzle removed.

2. Verify sprinkler operation and alignment for the direction of throw.

3. Check pop-up spray nozzling for proper arc of spray.

4. Determine whether uniform distribution exists over all areas.

B. Following final adjustment, operate the entire installation to demonstrate the complete and successful operation of all equipment.

3.03 WARRANTY

A. The irrigation system shall be warranted for a period of one year from the time of acceptance, for parts and labor by the installing contractor. This warranty shall be bonded and written to the Owner for both the warranty and the maintenance as outlined in the maintenance section.
B. The irrigation system equipment shall be warranted by the manufacturer for a period of three years from the date of installation, provided the system has been installed with all its equipment manufactured by one manufacturer. The only exception to this requirement are the electric remote control valves which shall be warranted for a period of 5 years by the manufacturer.

3.04 OPERATION AND MAINTENANCE

A. Maintenance:

1. Provide one hour operating instructions for Owner's representative prior to final acceptance.

2. Provide on-job site consultation with Owner's operating personnel for 6 months, not to exceed 4 hours per month, at no charge to the Owner. Any consultation work beyond this time limit shall be billed to the Owner on a time and materials basis. This extra consultation must be approved by the Owner's representative before said consultation shall be gin.

3. A three-year maintenance program with the property owner shall be included with the installation contract. This shall include all labor and materials to perform the following:

   a. Spring start-up of the system as soon as weather permits in the spring. Spring start-up shall include, but is not limited to, setting of the controller for proper operation, turning on water supply (if it has been turned off), and all the components that were winterized (backflow valve, etc.), close all the manual drain valves, check all valves and heads for proper operation and adjustment.
   b. Monthly checks of the system for proper operation and adjustment through the growing season.
   c. Winterize the system in the fall, after the irrigation season is over and before the first major freeze. Winterizing includes, but is not limited to, draining system and/or compressed air blow-out of the system (air pressure not to exceed the working pressure of the system), setting the controller for winter operation, checking exposed components (backflow preventer, etc.) for potential freeze damage, and draining all the manual drain valves. Winterizing may also include items not included in these specs but are usually included in winterizing programs in the local area.

B. Record Drawings and Controller Chart:

1. Maintain a complete set of up-to-date as-built drawings.

2. Prepare a controller chart:

    a. Showing the location of all sections, valves, lateral lines, and routes of control wires.
    b. Identify all valves as to size, station number, and type of irrigation head on each valve.
    c. Showing each station's area of coverage using a color coding, each station having a different color shading its area of coverage.
    d. Laminated between two pieces of plastic laminate.
    e. Complete and receiving approval prior to final inspection of the irrigation system.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 329200 – TURF AND GRASSES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Supplementary General Conditions", which form a part hereof whether attached hereto or not.

B. Under this item, the Contractor shall furnish and install topsoil, lawns and grasses in accordance with the plans, specifications, and as ordered by the Architect. This Contract includes all work of this Trade for a complete coordinated job, in order to provide an acceptable stand of turf by creating a rootzone mixture with seed or sod, including **decompaction of existing 12" of existing play field surfaces**, grading, topdressing, placing topsoil, soil amendments and sod, in accordance with the drawings as specified. The Contractor recognizes that the Plans and Specifications which form a part of this Contract reflect the overall intention and functional purpose, but that in all aspects the detailed Plans and Specifications might not be complete, but the Contractor does include as part of this work any and all provisions whether or not shown, to make his work under this Contract complete in every respect and to make any and all systems that he is responsible for complete system and to be in accordance with all authorities having jurisdiction.

C. Furnish all labor, material and appurtenance required for the installation of Topsoil and Seed as shown on the drawings and/or as herein specified. In general the work shall include but not necessarily be limited to the following:

1. Decompaction of existing 12" of existing play field surfaces, and placing (fine-grading) of topsoil as required for seeding.

2. Seeding, sodding and establishing permanent grass lawns or swale areas.

3. All other work required to complete the work of seeding, sodding and related items as shown on the drawings and as herein specified.

4. Establishment, protection, maintenance, clean-up and replacement of lawns as required under the specified guarantee.

D. The work must comply with the requirements of the following related specifications sections:

1. Section 013563 "LEED Requirements" for additional LEED requirements (For LEED Certified Projects)
2. Section 017419 "Construction Waste Management" for recycling construction waste (For LEED Certified Projects)

E. Section 310000 – Earthwork

F. Section 312500 – Erosion and Sediment Controls

1.02 SHOP DRAWINGS, SUBMISSIONS AND APPROVALS

A. All submissions shall be in accordance with Section 013300 submission requirements.

B. Submit manufacturer's product data for each material or accessory to be utilized in association with the work of this section. Include MSDS sheets for all fertilizers and limestone.

C. Submit topsoil certifications and test reports.

D. Within seven (7) calendar days after awarding of the Contract, submit the following:

E. List of all materials, equipment, and manufacturers proposed to be furnished. Shop drawings will not be reviewed prior to approval of the list of manufacturers.

F. List of name of any subcontractors to be used for approval.

G. Interim and final as-built surveys; reference Quality Assurance section below and Specification Section 017839.

H. **LEED Submittals: For LEED Certified Projects: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.03 REQUIREMENTS / QUALITY ASSURANCE

A. The Contractor shall provide his own Engineer and/or Licensed Surveyor for establishing all topsoil and seed limits in the field and grades as required to meet the requirements of the Contract Documents.

1. For athletic fields: Upon completion of subgrade, prior to laying topsoil, the contractor shall provide an interim topographical survey in the datum of the Construction Documents for review for conformance by the Architect. Spot elevations on said survey shall be in complimentary locations to the Construction Drawings.

B. Notice of Sources: Within 10 days following award of Contract, the Contractor shall notify the Architect of the sources of the materials required; they may be inspected and tested if desired by the Architect.

C. Topsoil Testing: The Contractor shall take samples of the topsoil and have tests made to determine the appropriate proportions of supplements necessary for properly conditioned material (such as "Quick Test" to determine if lime should be used). Methods used shall be as approved by the Association of Agricultural Chemists or the State Agricultural Experiment Station. Preparation work necessary to bring the topsoil into proper condition to receive seeding shall be made in accordance with said tests at no additional cost to the Owner. Copies of said tests and recommendations are to be submitted to the Architect for approval prior to starting the Work of this Section.

D. Fertilizer Application: The following shall apply to all of the work included in this specification section;

"Under New York State Law", phosphorus-containing fertilizer may only be applied to lawn or non-agricultural turf when:

- A soil test indicates that additional phosphorus is needed for growth of that lawn or non-agricultural turf; or

- The fertilizer is used for newly established lawn or non-agricultural turf during the first growing season."

Application Restrictions (all fertilizers)

New York State – no application between December 1 and April 1.
Nassau County – no application between November 15 and April 1.
Suffolk County – no application between November 1 and April 1.

E. Seeds: Packages of seed shall bear official State or Federal stamps and certificates indicating the type, quality, and content of the seed packages. Deliver packages unopened.

1.04 VERIFYING CONDITIONS

A. The Contractor shall examine all drawings which may affect the work of this section or require coordination by same.

B. Before starting any work, examine existing conditions and thoroughly check all drawings, specifications, adjoining or underlying conditions in which the work of this section is to be performed, and all dimensions.

C. Report in writing to the Architect any and all conditions which may interfere with or otherwise affect work of this section.

D. Seeding operations shall be conducted under favorable conditions during the next season or seasons which are normal for such work as determined by accepted practice in the locality of the Project.

1.05 PROTECTION OF WORK

A. Landscaped areas shall be protected by the Contractor against traffic damage, erosion, or other use by erecting barricades or temporary fencing immediately after seeding is completed and by placing warning signs of a type approved by the Architect on various areas. These barricades, or temporary fencing, and signs shall be maintained until the lawns are well established.

B. The Contractor shall maintain all seeded areas without additional payment until the expiration of the maintenance period. Any areas that fail to show a uniform stand of grass will be reseeded and re-fertilized at the Contractor's expense, until an acceptable stand of grass is established.

C. Upon final acceptance of the work specified herein, the Contractor shall remove all barricades or temporary fences.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Topsoil: Stockpiled topsoil may be used, provided it meets the requirements of these specifications. Additional topsoil from certified off-site sources shall be used, provided it meets the requirements of these specifications. Topsoil for lawn and planting operations shall be fertile, friable, natural loam containing a liberal amount of humus. It shall be free of admixtures and subsoil and shall be reasonably free of noxious weed, seed, lumps, plants, or their roots, and completely free of stones, sticks, and other extraneous matter, and shall not be used for planting operations while in a frozen or muddy condition. After spreading to a uniform depth of 6" minimum, all topsoil shall be raked to remove all extraneous matter. Raked topsoil shall conform to the mechanical analysis specified below and shall be free of stones, lumps, plants or their roots, sticks and similar debris, or any other undesirable material. Topsoil shall not be used in a muddy or frozen condition.

1. All topsoil to be furnished shall be subject to the approval of the Architect. Furnish a certified analysis, made by a recognized authority, of any topsoil that may have to be furnished to complete the work of this section. Test reports shall match the format listed below.

2. Topsoil shall have an acidity range of pH 5.0 to 7.0 and shall contain not less than 6 percent organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees centigrade. The mechanical analysis of the soil shall be as follows:

Passing	Retained On	Percentage
1" screen		100%
1" screen	¼" screen (gravel)	Not more than 3%
¼" screen	No. 100 USS mesh sieve (sand)	40%-60%
#100 USS	(Very fine sand, silt & clay)	40%-60%

3. Topsoil in which more than 60 percent of the material passing the USS No. 100 mesh sieve consists of clay as determined by the Pouyoucous hydrometer or by the decantation method, shall not be used. All percentages are to be based on dry weight samples. The chemical and mechanical analysis shall state the above items in correct quantities.

4. The Architect reserves the right to take samples of the topsoil from time to time, whether delivered to or stored at the site. These samples will be analyzed for comparison with the Specifications. Should tests show that topsoil does not comply with the Specifications, the material may be rejected or such other remedy made as approved by the Architect in the form of the addition of humus or other supplemental materials.

5. The topsoil mixture materials shall be thoroughly mixed by hand or by rotary mixer to the satisfaction of the Architect.

B. Sand: Sand shall be ASTM C-33 concrete sand. The sand shall have a fineness modulus of 2.5-3.2 and a coefficient of uniformity of less than 4.

C. Ground Limestone: Ground Limestone (calcium carbonate) shall have the following analysis: at least fifty (50) percent shall pass a 200 mesh sieve; at least ninety (90) percent shall pass a 100 mesh sieve; and one hundred (100) percent shall pass a 10 mesh sieve. Total carbonate shall not be less than eighty-five (85) percent for purposes of calculation, total carbonate shall be considered as calcium carbonate.

D. Organic Fertilizer: Organic fertilizer shall be used for surface application after grass has germinated. Organic activated fertilizer shall contain the following percentage by weight: 5% minimum of nitrogen, 45% phosphoric acid, and other nutritious basic elements.

E. Chemical Fertilizer: Commercial fertilizer shall be used for initial preparation and shall conform to the applicable state fertilizer laws. Commercial fertilizer shall be a complete fertilizer and shall be an organic based product suitable for the establishment of the turf and grass species described herein and/or as noted on the Contract Plans. Examples of acceptable products and Suppliers/Manufacturers are: *PRO-GRO* by *North Country Organics* of Bradford VT., Ph. (802) 222-9661; *LAWN BOOSTER* by *Organica Inc*. of Norristown PA., Ph. 1-888-24GREEN, or locally at (631) 544-0348.

1. Application rate, sequence, and methods shall be as recommended by the manufacturer based on soil conditions of the areas of installation as tested by the Contractor, and on the intended grass stand character (i.e. turf area). The Contractor shall coordinate the review of the recommendations between the Architect, the Manufacturer, and the Contractor's Installer. Commercial fertilizer application shall be properly coordinated with the application of any other soil amendments that may be necessary.

F. Humus / Compost: Humus shall be of native type and consist of reed peat or sedge peat, but not peat moss, and of such physical condition that it can be readily incorporated with topsoil. It shall be free from sticks, stones, weedy roots, glass or toxic substances or other foreign matter. When delivered from stock piles, humus shall contain between 35 percent and 50 percent moisture. Use only natural domestic humus suitable for soil mulch and of such composition as to furnish ample water holding capacity and retention of plant food. Humus shall be dark brown to black in color, granulated, free of weed seed and lumps and show analysis as follows:

1. 25 percent - 45 percent moisture by weight as delivered from stockpile.
2. 5.0 - 7.5 pH (acidity).
3. Minimum 300 percent water absorbing ability (oven dried at 100 C.).
4. 85 percent minimum organic matter on dry basis (samples dried at 65 C.).
5. Low in content of wood material, suphur, iron, or other heavy metals.
6. Ash, on dry basis: not more than 10 percent.
7. Soluable salts less than 4.0.
8. Solvita Maturity number between 6 and 8.
9. Carbon / Nitrogen ratio - greater than 30:1.
10. Particle size shall pass a ¼" screen.
11. Low phosphorous and nitrogen content.

Humus shall be obtained from fresh water site, conditioned in storage piles after excavation for at least 6 months, including one freezing, thawing period.

Certification and Testing: The Contractor shall submit a certificate of materials regarding the composition of the compost from a certified Seal of Testing Assurance Program, Compost Testing Program Laboratory. The test shall be for the actual material to be used on the project, from the stock piles. Stock piles of this material shall be visited by the Landscape Architect, with all expenses paid for by the Contractor.

One such laboratory is located on Long Island:

SOIL FOODWEB NEW YORK, INC.
555-7 Hallock Avenue
Port Jefferson Station, NY 11776
Phone: (631) 474-8848
Fax: (631) 474-8847
info@soilfoodwebnewyork.com

G. Mulch: Weyerhauser "Silva-Fiber", or equal, available from American Excelsior Corporation, Chicago, Illinois.

H. Erosion Control Blanket: Use "Ero-Mat, standard", as manufactured by Verdyol and distributed by Erosion Control Systems, Inc., Tuscaloosa, Alabama; (1-800-942-1986). Install with 11 gauge or heavier steel wire staples with 6 inch long legs and a 1 inch crown. Note: "Ero-Mat, High Velocity" for use on slopes greater than 3:1 and 60 ft. long; or in areas where a high velocity of water is expected - duration is 4-1/2 to 5 feet/second range (in swales).

I. Water for Turf Establishment: Water suitable for turf establishment will be available on-site to the Contractor as coordinated with the Owner. The Contractor shall provide all devices required for the distribution of water (provided by Owner) until turf is fully established. If an irrigation system has been installed or is already in place, this shall serve for distribution. The proper amount and frequency of watering will be the responsibility of the Contractor. In general terms, during dry weather, grassed areas shall be watered daily with sprinklers until grass is firmly rooted.

J. Grass Seed: The Contractor shall furnish and place all materials required for seeding in all topsoiled areas. The seed used shall be fresh, re-cleaned seed of the latest crop, mixed in the following proportions by weight, and meeting the following standards of pure live seed content. The tolerance for PLS (purity x germination) shall be those called official and tabulated on page 5, US Department of Agriculture Bulletin No. 480.

Grass seed mixes shall be as noted below. Submit mix percentages for approval. Percent pure live seed (PLS) shall be 95% minimum. Maximum percent weed seed shall be .50%. Germination shall be 85% or better.

All seed shall be delivered in the original packages, unopened, which shall include a guaranteed analysis by the vendor. The seeds shall be pre-mixed prior to delivery to the job site, or as otherwise directed by the Architect. The grass seed shall be of the latest crop, mixed in the following proportions by weight:

70% - Tall Fescue
20% - Turftype Ryegrass
10% - Kentucky Bluegrass

All seed shall exhibit minimum 98% Purity and minimum germination of 90%.

Unless specifically indicated otherwise above, the following varieties of turfgrasses shall include:

Tall Fescue: *Rebel, Falcon, Mustang, Jaguar, Houndog.*
Turftype Ryegrass: *Manhattan II, Prelude, Palmer, Omega, Regal*.
Kentucky Bluegrass: *Eclipse, Adelphi, Glade, Sydsport, Baron*.

The rate of seeding shall be as recommended by the supplier/manufacturer for the type of seeds used in the mix and the intended purpose of the planted area. The intent of the Restored Lawn Area seeding is to provide turf lawn to blend in with the areas adjacent to the disturbed area being planted. Supplier shall coordinate the final rate with the Architect, who shall have final authority for approval. Grass seed shall be sown in the fall from August 25 to October 1, or in the spring, between March 15 and May 1. Seeding shall be done in dry or moderately dry soil, and at times when the wind velocity does not exceed 5 mph.

Sowing of Seed: Immediately before any seed is to be sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of uniformly-fine texture. Lawn areas shall be seeded evenly with a mechanical spreader, at a rate of 10.0 pounds to 1,000 sq.ft. of ara, lightly raked, rolled with a 200 pound roller and watered with a fine spray. The method of seeding may be varied at the discretion of the Contractor to establish a smooth, uniform turf composed of the grasses specified. Re-seeding shall be done in accordance with this procedure.

Grass seed shall be sown in three different passes by approved machine in such a manner that a uniform stand will result. After seeding, the surface shall be evenly raked with a fine toothed rake and rolled with an approved roller, as directed by the Architect. Seeding by hydraulic means may be used if approval is obtained from the Architect.

K. Sod: Sod shall be provided where specified within the contract drawings and may be used as an alternative to seed to establish turf in the areas called out for seeding (at no additional cost to the Owner). The Contractor shall request the alternative if it is needed to complete the project in weather not conducive to turf establishment by seeding, or as specified on the drawings. The Architect shall approve the use of the alternative. All sod shall be grown and cut from a sand-based field. Approved sod is superior sod grown from high-quality seed of known origin. Seed is to be inspected by Certification Agency to assure satisfactory genetic identity and purity, overall high quality and free from noxious weeds at time of harvest.

1. The sod shall be of the highest quality, strongly rooted, free from noxious weeds and grubs, mowed to a height not to exceed 3” prior to lifting, cut in minimum 18" wide x 5' lengths (7-1/2 sq.ft.) to a depth of 1" minimum, or in rolls 4’ wide x 50’ long (200 sq.ft.) and shall be at least one year old. Measurement for thickness shall exclude top growth thatch. It shall be harvested from one field to ensure a uniform color and texture. Sod shall be machine cut. Standard sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically. Sod shall not be harvested or transplanted when moisture content may adversely affect its survival.

2. The mixture of grass seed from which the sod was grown shall consist of approximately the following mixture of permanent grasses: 70% Tall Fescue, 20% Turftype Ryegrass, 10% Kentucky Bluegrass - or - 50% shade tolerant Kentucky Blue Grass - 20% Manhattan II Rye Grass - 30% Pennlawn Fine Fescue (blend as selected by the Architect). All sod shall be inspected prior to delivery.

3. Sod shall be harvested, delivered and transplanted within a period of 36 hours. Before cutting, sod shall be mowed uniformly at a height of 1-1/2 inches.

4. Strength of Sod Sections: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section.

5. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.

6. Thatch: Sod shall be relatively free of thatch up top ¼ inch allowable (uncompressed).

7. Diseases, Nematodes and Insects: Sod shall be reasonably free of diseases, nematodes and soil-borne insects.

8. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than two (2) such plants are found per 200 s.f. of area. Sod will not be acceptable if it contains any of the following weeds: common Bermuda grass (wire-grass), quackgrass, johnsongrass, poison ivy, nutsedge, niblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel and bromegrass.

9. Architect/Engineer may inspect the sod before it is harvested, but reserves the right to reject, on or after delivery, any sod which in his opinion does not meet with the specification requirements.

L. Rootzone Mix Ratio: The rootzone mix shall utilize all existing topsoil stockpiled and shall incorporate an additional 3” of sand and 1” of compost at no additional cost to contract.

M. Topdressing: The entire portion of the field not being repaired for low spot filling shall receive a full ½” of topdressing using organic matter which shall be a mature, stable compost with an organic matter content of 6-8% and be free of glass or toxic substances. This material is available from *Agresource*, called *Agresoil Compost*, and is made from bio solids, not leaf mold. Contact number: 1-800-313-3320.

N. Overseeding: Overseeding shall be accomplished by a drill seeder in three different passes using the following seed mixture:

Percent	Turfgrass Species / Variety	Min. Purity %	Germ. %
70%	Tall Fescue	98%	90%
20%	Turftype Ryegrass	98%	90%
10%	Kentucky Bluegrass	98%	90%

Acceptable varieties of each turfgrass shall include:

Tall Fescue: *Rebel, Falcon, Mustang, Jaguar, Houndog*.
Turftype Ryegrass: *Manhattan II, Prelude, Palmer, Omega and Regal*.
Kentucky Bluegrass: *Eclipse, Adelphi, Glade, Sydsport and Baron.*

Rate of seeding shall be 10 lbs. per 1,000 sq.ft. pf pure live seed (pls.).

PART 3 – EXECUTION

3.01 STRIPPING TOPSOIL

A. All topsoil shall be stripped as described and stockpiled for reuse. No topsoil is to be removed from the site.

3.02 GRADING AND SUBGRADE PREPARATION

A. Perform grading operations to bring subgrade to levels required and to contour indicated on the drawings.

B. Completed subgrade shall be approved by the Architect/Engineer before topsoil and sodding.

C. The approved subgrade shall be scarified to a depth of 2 inches to permit mixing with rootzone material.

D. Where work involved is not in an area designated for regarding, the existing grade shall be rototilled to a depth of 8 inches. The area shall then be leveled and stones raked out.

3.03 ROOTZONE / SEED BED PREPARATION

A. Seasonal and Weather Limitations – All operations including seedbed preparation shall be performed only when the soil is in proper condition to permit satisfactory work. Continuation of work at other than specified times or conditions shall proceed only with consent of the Architect/Engineer.

B. Leveling – Any undulations or irregularities in the surface resulting from tillage or any other causes shall be leveled prior to placing sod. Flooded, washed out or otherwise damaged areas shall be reconstructed and all grades reestablished in conformance with the drawings and specifications.

C. Before any soil is placed, the subgrade shall be graded to a smooth, uniform surface, parallel to and below finished grade. The subgrade surface shall be compacted with an approved roller weighing approximately five hundred (500) pounds, then scarified to a depth of 3” for proper mix of rootzone material. Hollows, depressions and gullies shall be filled with acceptable material free from stones over two inches (2”) in diameter, cinders, rubbish and other unsuitable material.

D. **New rootzone shall be decompacted to a depth of 12”** prior to seeding or sodding utilizing a ‘BLEC’ Ground Breaker Machine, VertiDrain or equal; on 10” centers, using 5/8” wide slits, **12” deep** to provide compaction relief. Rototilling the fields is specifically excluded.

E. Cleanup – Prior to placing sod, the surface shall be cleared of all trash, debris and stones larger than two inch (2”) diameter, and of all roots, brush, wire, grade stakes and other objects that could be a hindrance to maintenance operations and use.

F. Commercial Fertilizer:

1. Fertilizer for Rootzone Mix: Commercial fertilizer (14-28-15) shall have the following composition by weight: Nitrogen 14%; Phosphorous 28%; Potash 14%; as manufactured by Jonathan Green “New Seeding Lawn Fertilizer”.

2. Fertilizer for Post Seeding/Sodding: 50% slow release commercial fertilizer (28-3-5) shall have the following composition by weight: Nitrogen 28%; Phosphorous 3%; Potash 5%. The guaranteed analysis shall have a minimum 50% of the total nitrogen as a “slow-release” type.

    a. Contractor shall at the direction and discretion of the Architect/Engineer furnished a certified report of an approved analytical chemist, showing the analysis of representative

samples of the commercial fertilizer which he proposes to use. All samples are to be taken by the Architect/Engineer, and delivered to the laboratory; the price bid shall include inspection and laboratory charges. No commercial fertilizer shall be delivered until the approval of samples by the Architect/Engineer, but such approval does not constitute final acceptance. The Architect/Engineer reserves the right to reject on or after delivery any material which does not, in his opinion, meet these specifications.

b. Apply new seeding lawn fertilizer at the full rate recommended by the manufacturer for new lawns, using a mechanical spreader, not by hand; Fertilizer shall then be worked lightly into the top 3" of the rootzone material.

c. Apply 50% slow-release type fertilizer as soon as sod has been installed. The first application shall be made at ½ the manufacturer's recommended rate for new lawns. A second application shall be made at ½ the manufacturer's rate for new lawns six (6) weeks after the first application of same.

G. Topsoil Placement and Finish Grading:

1. Topsoil shall be spread on the previously prepared subgrade or surface of select granular fill, scarified to permit proper bonding with the topsoil. The topsoil shall be placed on all specified areas within the Limit Lines shown on the drawings, all areas disturbed by the work of this contract, and as directed by the Architect.

2. Topsoil shall be raked, properly set and compacted to establish uniform lawn/grass growth, and otherwise manipulated to form, after settlement, smooth draining grades as shown on the drawings. The depth of the topsoil for lawn areas after compaction shall be six inches.

3. The Contractor shall provide, at his own expense, protection for all topsoil areas against trespassing and damage at all times. Damaged areas shall be treated or replaced as directed by Owner's Representative.

H. Install irrigation system components for initial turf establishment only in accordance with the system manufacturer's instructions, as noted on the Contract Drawings, and as required by local jurisdictional regulations, to provide a fully operational system. In all cases, minimize the disturbance of previously placed materials and repair any damaged sections.

I. If a temporary irrigation system is indicated within the Contract Drawings, it's installation shall be properly coordinated by the Contractor so as not to affect the seeding process. Temporary systems shall remain until required stand of grass and percentage germination has been established and maintained for a minimum of two (2) weeks from initial germination.

3.04 SEEDING OPERATIONS:

A. General:

1. Furnish all materials required for seeding lawn areas in topsoiled areas.

2. Prior to seeding operations, all areas to be seeded shall be thoroughly disked or otherwise loosened to a depth of 4 inches and shall be carefully raked to true lines free from all unsightly variations, bumps, ridges or depressions, brought to finished grade elevations as shown on the drawings. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Two pounds of 15-20-10 formula commercial fertilizer per cu.yd. shall be thoroughly mixed with the topsoil or not less than 10 lbs. per 1,000 sq.ft. of lawn surface, whichever is the greater.

3. Seeding:

a. Purpose: To provide permanent vegetative cover and to control storm water run-off and erosion.

b. Where Applicable: All areas not covered by buildings and pavement within the limit lines as shown on the contract plans, and all other existing lawn areas disturbed or damaged by the work of this contract.

4. All areas to be seeded in lawn shall be thoroughly disked or otherwise loosened to a depth of four (4) inches and shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. As specified, all sticks, stones, roots or other objectionable material that might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Ground limestone, humus and commercial fertilizer shall be applied as specified:

5. Apply ground limestone uniformly at a minimum rate of 100 pounds per 2,000 square feet, or as determined by analysis. The ground limestone shall be distributed evenly, by machine, over all areas to be seeded. It shall be worked lightly into the top three (3) inches of the soil, at least five (5) days before applying fertilizer.

6. Apply fertilizer uniformly at a minimum rate of 10 pounds per 1,000 square feet. Fertilizer to be 10-10-10. Apply humus at the rate of 3-1/3 cubic yards per 1,000 square feet. Note: Application rate, sequence, and methods shall be as recommended by the manufacturer based on soil conditions of the areas of installation as tested by the Contractor, and on the intended grass stand character (i.e. turf area). The Contractor shall coordinate the review of the recommendations between the Architect, the Manufacturer, and the Contractor’s Installer. Commercial fertilizer application shall be properly coordinated with the application of any other soil amendments that may be necessary.

7. Work lime, fertilizer and humus into soil to a minimum depth of 3 inches using any suitable equipment.

8. The soil shall then be raked to a smooth, even draining surface and properly set and compacted to establish uniform lawn/grass growth with an approved roller or as otherwise directed by the Architect. Manipulate to form, after settlement, smooth draining grades as shown on the drawings. Any depressions which occur shall be re-graded and re-rolled until a satisfactory grade is obtained.

9. Time of Seeding: Grass seed shall be sown preferably in the fall between August 15th and October 1st or in the spring between April 1st and May 15th, or at such other times as are approved by Owner's Representative. All seeding is to be done in dry, or moderately dry soil and at times when the wind does not exceed a velocity of five miles per hour.

10. Seed shall be sown at the rate as recommended by the supplier/manufacturer for the type of seeds used in the mix and the intended purpose of the planted area. The intent of the Restored Lawn Area seeding is to provide turf lawn to blend in with the areas adjacent to the disturbed area being planted. Supplier shall coordinate the final rate with the Architect, who shall have final authority for approval. Grass seed shall be sown in the fall from August to October, or in the spring, between March and May. Seeding shall be done in dry or moderately dry soil, and at times when the wind velocity does not exceed 5 mph. Grass seed shall be sown by approved machine in such a manner that a uniform stand will result. After seeding, the surface shall be evenly raked with a fine toothed rake and rolled with an approved roller, as directed by the Architect. Seeding by hydraulic means may be used if approval is obtained from the Architect.

B. Hydroseeding Option: The Contractor may utilize a hydroseeding option, as indicated above. If hydroseeding shall be supplied as a zero-cost option to the Owner, the Contractor shall supply the name, address and contact information of his hydroseeding subcontractor to the Architect for contact and discussion. The hydroseed blend to be submitted by the Contractor shall be equal and

comparable to the standard seed blend(s) indicated within this specification section for the intended turf establishment. The blend shall be submitted to the Architect in advance as a part of the shop drawings submittal process.

3.05 MULCHING:

A. All seeded areas shall be covered with approved mulch not later than 3 days following seeding. Ground surfaces shall be completely covered at the rate of at least 2 tons an acre. The Contractor shall utilize a Bowie Hydromulcher or equal to apply all mulch.

B. All areas to receive permanent seeding shall be mulched as described in the specifications and as noted herein.

C. On slopes 4 horizontal to 1 vertical, or greater, and in drainage swales, mulch shall be anchored using erosion control blanket or other approved netting properly fastened in place. Install rolls in proper direction with overlap and staple pattern set in accordance with the manufacturer's requirements.

D. In any event, the Contractor is responsible for mulch remaining intact until grass has germinated and has reached a minimum height of one inch.

3.06 SODDING:

A. The Contractor shall furnish and place all materials required for sod in all topsoiled areas. The sod may be installed at any time between August 15th and June 1st when the ground is not frozen. Sod shall be placed only when weather and soil conditions are suitable for proper knitting and development of sod. Sod shall not be placed on a muddy rootzone or during periods of extreme heat. No sod shall be installed without approval of the Architect. All areas to receive sod shall be thoroughly disked or otherwise loosened to a depth of 4 inches and shall be raked to true lines free from all unsightly variations, bumps, ridges, or depressions. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil.

B. The sod shall be placed on a minimum of 4" of properly compacted topsoil. The sub grade of topsoil shall be graded so that after the sod is placed, the finished grade shall meet existing grades specified by the Architect. The soil shall be raked to a smooth, even-draining surface, and compacted with an approved roller as directed by the Architect/Engineer. Any depressions which occur shall be re-graded and re-rolled until a satisfactory grade is obtained.

C. Before the sod is placed, an application of super-phosphate shall be applied to the sub-grade topsoil at the rate of 20 pounds per 1,000 square feet and raked into a depth of 1 inch.

D. Starter Strip; The first row of sod should, if possible, be laid in a straight line with subsequent rows placed parallel and tightly against one another. Lateral joints shall be staggered to promote a more uniform growth and strength. Care shall be exercised to ensure that the sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would permit air drying of the roots. The sod shall be placed in 18" x 5' lengths and rolled with at least a 200-pound roller; as the sod is completed in any one section, the entire area shall be rolled. After rolling, the finished grade shall conform evenly to the grades on the plan or according to given grades by the Architect. The sod shall then be thoroughly watered to a depth sufficient that the underside of the new sod pad and soil immediately below are thoroughly wet.

E. Watering During Installation: During periods of high temperature, the sod shall be lightly watered to prevent wilting during the progress of the work; as sod is completed in any one section, the entire section shall be thoroughly irrigated to a depth of 5 inches or more. In general, the sod shall be thoroughly watered until the root system has become sufficiently knit, at which time the Contractor

will be relieved of his responsibility for maintenance and watering. Watering apparatus shall then be removed by the Contractor.

F. Joint Dressing: As soon as practical following the initial watering, but in every case prior to the second watering, the entire area shall be examined for open joints or other signs of surface imperfections. Any open joint or other voids shall be carefully filled with sand to prevent air drying of the roots and to eliminate undulations in the surface.

G. The first mowing shall not be attempted until the sod is firmly rooted and secure in place. Not more than 40% of the grass leaf shall be removed by mowing. Grass height shall be maintained between 1-1/2" and 2-1/2" until final acceptance and completion of the whole work under this contract. Any unsatisfactory sod shall be removed and replaced at the Contractor's expense.

3.07 RECONDITIONED LAWNS

A. Recondition existing lawn areas damaged by the Contractor’s operations, including storage of materials or equipment and movement of vehicles. Also, recondition lawn areas where settlement or washouts occur or where minor regrading is required.

1. Recondition other existing lawn areas.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from the Contractor’s operations, including oil drippings, fuel spills, stone, gravel and other construction materials, and replace with new topsoil.

C. Where substantial lawn remains, mow de-thatch, core aerate and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. DO not use pre-emergent herbicides.

D. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation and turf, and legally dispose of it off the Owner’s property.

E. Till stripped, bare and compacted areas thoroughly to a depth of 6 inches.

F. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Provide new planting soil as required to fill low spots and meet new finish grades.

G. Apply seed and protect with straw mulch as required for new lawns.

H. Water newly-planted areas and keep uniformly moist until new grass is established.

3.08 WATERING

A. The Contractor shall be responsible for the proper watering for all sodded areas until Substantial Completion of the work as hereinafter specified. The proper amount and frequency of watering will be the sole responsibility of the Contractor.

B. In the absence of adequate rainfall, watering shall be performed daily during the first week, and shall be sufficient to maintain moist soils to a depth of at least 5 inches. Water should be applied immediately if at any time the sod shows indications of wilting.

C. Subsequent Watering: Sod shall be watered as required to maintain adequate moisture in the upper 5 inches of soil. In the absence of rainfall, sod shall be watered at frequencies dictated by need.

3.09 CLEAN-UP

A. Soil, manure, peat or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean. Upon completion of the planting, excess stones and debris, which has not been previously cleaned up, shall be removed from the site or disposed of as required by the Architect, except topsoil shall be spread or piled on the site as directed by the Architect. Lawns and planting areas shall be prepared for final approval.

3.10 MAINTENANCE, REPLACEMENT, GUARANTEE AND FINAL INSPECTION:

A. Maintenance operations shall begin immediately after the seed is sown/sod installed and shall be continued as required until Substantial Completion. Grass shall be kept in healthy growing condition by mowing, watering, weeding, cultivating, disposal of waste vegetation, fertilizing, spraying or spreading of approved materials to prevent or treat infestations of insects or disease and all other operations required to produce and maintain a strong, vigorous and healthy stand of grass. Lawn areas shall be mowed to a height of 2 inches whenever the average height of grass is over 3 inches. When the amount of cut grass is heavy, it shall be removed to prevent the destruction of the underlying turf.

B. Seeded or sodded areas that are determined to be dead within warranty period, or in the opinion of the Architect, in an unhealthy, unsightly, or badly impaired condition, shall be replaced by the Contractor as soon as reasonably possible after the unsatisfactory condition has been evident. No replacement shall be made in any season definitely unfavorable for seeding or sodding. Such replacements shall be made in the same manner as specified for the original seeding or sodding.

C. Seeded Lawns: Seeded lawns shall be protected and maintained by watering, mowing and replacing for 60 days or as long as may be necessary to produce a uniform stand of grass. After grass is up, it shall be top-dressed with organic lawn fertilizer. Maintenance shall continue until a uniform turf is established. For the purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than one square foot, will be allowed up to a maximum of 3 percent of the lawn area. Areas not meeting this requirement will be reseeded.

D. Sodded Lawns: Sodded lawns shall be protected and maintained for 30 days or as long as necessary for the roots to be firmly established.

E. Surface Application of Fertilizer: Spread a second application of organic lawn fertilizer at the end of the maintenance period for both seeded and sodded lawns. Spreading rate shall be as recommended by the manufacturer.

    1. Sodded Areas: Use 18-5-9 or 12-4-8.
    2. Seeded Areas: Use 18-5-9 or 24-6-8.

        a. The second application of fertilizer shall be witnessed by the Owner or his representative, and a signed document shall be submitted to the Architect certifying the Work has been performed. The document shall be signed by the installer and the Owner's or Architect's witness.

F. Provide labor and equipment for maintenance, including the necessary watering and mowing equipment to meet the requirements herein established.

    1. The Owner will furnish the water used to maintain the lawns as specified.

G. Turf must have had a minimum of three (3) mowings before a request for acceptance can be considered.

H. Initial inspection of the seed or sod work to determine Substantial Completion of the work will be made by the Architect upon written notice requesting such inspection submitted by the Contractor at least 10 days prior to the anticipated date of inspection. Request may be made subsequent to the third mowing of the turf.

I. Acceptance: After inspection, the Contractor will be notified in writing by the Architect/Engineer of Substantial Completion of all work, or, if there are any deficiencies, of the requirements for completion of the work. Work remaining to be done or redone will be subject to re-inspection before Substantial Completion is given.

J. All seeded and sodded areas shall be guaranteed for a period of one full year / one complete growing season, commencing with the date of Substantial Completion.

K. Upon Substantial Completion, the Owner will assume general responsibility for maintenance of the lawn areas. The Contractor shall, however, make monthly visits to the site during the guarantee period to advise the Owner of proper maintenance procedures. No additional payment shall be made for visits. Price bid for the work of this trade shall include costs of visits.

L. Failure of the Contractor to notify the Architect/Engineer, in writing, of inadequate maintenance by the Owner of the lawn areas installed under this contract shall constitute acceptance of the Owner's maintenance operations by the Contractor. The Contractor shall not, therefore, use the Owner's alleged lack of proper maintenance as a basis for voiding his responsibilities under the guarantee herein specified.

M. At the expiration of the guarantee period, upon written request of the Contractor, inspection for Final Acceptance will be made by the Architect/Engineer. All remedial work to turf areas by the Contractor shall be completed prior to the request for Final Acceptance.

3.11 GUARANTEE / REPLACEMENT

A. The Contractor guarantees, by acceptance of the Contract that all work installed will be free from any and all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified. If, during the period of one (1) year, or as otherwise specified, from date of the certificate of completion and acceptance of the work, should any defects in workmanship, material or performance appear, he will, without cost to the Owner remedy such defects within a reasonable time to be specified in writing by the Architect. In default thereof, the Owner may have such work done and charge cost to the Contractor.

B. The Contractor shall provide the Architect a written guarantee covering fully the one (1) year guarantee period. Lawns shall be warranted for the minimum duration of one full year, to include one full growing season after seeding and sodding, and shall be alive and in satisfactory growth at the end of the warranty period. The growing season is defined as beginning May 1 and ending October 1.

C. At the expiration of the guarantee period, upon written request by the Contractor, inspection for Final Inspection will be made by the Architect. All remedial work to seeding by the Contractor shall be completed prior to the request for final inspection. If lawns do not show a healthy, uniform stand of grass, those areas shall be re-seeded or re-sodded as soon as conditions permit, but during the spring or fall seeding periods.

D. Owner's Responsibility: If an area of seeding or sodding during the warranty and replacement period is found to be damaged or destroyed due to vandalism, malicious mischief, vehicle ruts and tracks, or acts of God such as flooding, storm debris, etc., then the Owner shall have the responsibility of replacing those lawn areas without cost or responsibility to the Contractor.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 329219 – SEEDING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Grass Seed Mixture

B. Preparation of subsoil

C. Placing Topsoil

D. Hydroseeding, Mulching and Fertilizer

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork
B. Section 329400 – Plant Maintenance

1.03 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture(s).

1.05 DELIERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers or bags. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.06 SUMITTALS FOR REIVEW

A. Submittals shall be in accordance with Section 013300.

B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

PART 2 – PRODUCTS

2.01 SEED MIXTURE

A. Seed Blend shall have the following composition,

1. Kentucky Blue Grass: 40 percent, three (3) varieties, minimum.

2. Perennial Rye Grass: 60 percent, three (3) varieties, minimum.

2.02 TOPSOIL

A. Topsoil provided for grass seed growing media shall be in strict accordance with Section 310000 – Earthwork.

2.03 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

B. Fertilizer: Organic Type; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is properly graded and ready to receive the work of this Section.

3.02 PREPARATION

A. Prepare subgrade in accordance with Section 310000 – Earthwork.

B. Place topsoil in accordance with Section 310000 – Earthwork.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.04 HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate of 7 lbs per 1000 sq. ft., evenly in two intersecting directions.

B. Do not hydroseed area in excess of that which can be mulched on same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate top 4 inches

of soil.

E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches in area.

3.05 MAINTENANCE

A. Maintain all seeded areas in accordance with Section 329301 - Plant Maintenance.

B. Protect all seeded areas with warning signs and flagging tape during maintenance period.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 329219.11 – NATIVE PLANT SEEDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Supplementary General Conditions", which form a part hereof whether attached hereto or not.

B. Under this item, the Contractor shall furnish and install topsoil, lawns and grasses in accordance with the plans, specifications, and as ordered by the Architect. This Contract includes all work of this Trade for a complete coordinated job, in order to provide an acceptable stand of turf by creating a rootzone mixture with seed or sod, including **decompaction of existing 12" of existing play field surfaces**, grading, topdressing, placing topsoil, soil amendments and sod, in accordance with the drawings as specified. The Contractor recognizes that the Plans and Specifications which form a part of this Contract reflect the overall intention and functional purpose, but that in all aspects the detailed Plans and Specifications might not be complete, but the Contractor does include as part of this work any and all provisions whether or not shown, to make his work under this Contract complete in every respect and to make any and all systems that he is responsible for complete system and to be in accordance with all authorities having jurisdiction.

C. Furnish all labor, material and appurtenance required for the installation of Topsoil and Seed as shown on the drawings and/or as herein specified. In general, the work shall include but not necessarily be limited to the following:

1. Decompaction of existing 12" of existing play field surfaces, and placing (fine-grading) of topsoil as required for seeding.

2. Seeding, sodding and establishing permanent grass lawns or swale areas.

3. All other work required to complete the work of seeding, sodding and related items as shown on the drawings and as herein specified.

4. Establishment, protection, maintenance, clean-up and replacement of lawns as required under the specified guarantee.

D. The work must comply with the requirements of the following related specifications sections:

1. Section 013563 "LEED Requirements" for additional LEED requirements (For LEED Certified Projects)

2. Section 017419 "Construction Waste Management" for recycling construction waste (For LEED Certified Projects)

E. Section 310000 – Earthwork

F. Section 312500 – Erosion and Sediment Controls

1.02 SHOP DRAWINGS, SUBMISSIONS AND APPROVALS

A. All submissions shall be in accordance with Section 013300 submission requirements.

B. Submit manufacturer's product data for each material or accessory to be utilized in association with the work of this section. Include MSDS sheets for all fertilizers and limestone.

C. Submit topsoil certifications and test reports.

D. Within seven (7) calendar days after awarding of the Contract, submit the following:

1. List of all materials, equipment, and manufacturers proposed to be furnished. Shop drawings will not be reviewed prior to approval of the list of manufacturers.

2. List of name of any subcontractors to be used for approval.

E. Interim and final as-built surveys; reference Quality Assurance section below and Specification Section 017839.

F. **LEED Submittals: For LEED Certified Projects: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.03 REQUIREMENTS / QUALITY ASSURANCE

A. The Contractor shall provide his own Engineer and/or Licensed Surveyor for establishing all topsoil and seed limits in the field and grades as required to meet the requirements of the Contract Documents.

1. For athletic fields: Upon completion of subgrade, prior to laying topsoil, the contractor shall provide an interim topographical survey in the datum of the Construction Documents for review for conformance by the Architect. Spot elevations on said survey shall be in complimentary locations to the Construction Drawings.

B. Notice of Sources: Within 10 days following award of Contract, the Contractor shall notify the Architect of the sources of the materials required; they may be inspected and tested if desired by the Architect.

C. Topsoil Testing: The Contractor shall take samples of the topsoil and have tests made to determine the appropriate proportions of supplements necessary for properly conditioned material (such as "Quick Test" to determine if lime should be used). Methods used shall be as approved by the Association of Agricultural Chemists or the State Agricultural Experiment Station. Preparation work necessary to bring the topsoil into proper condition to receive seeding shall be made in accordance with said tests at no additional cost to the Owner. Copies of said tests and recommendations are to be submitted to the Architect for approval prior to starting the Work of this Section.

D. Seeds: Packages of seed shall bear official State or Federal stamps and certificates indicating the type, quality, and content of the seed packages. Deliver packages unopened.

1.04 VERIFYING CONDITIONS

A. The Contractor shall examine all drawings which may affect the work of this section or require coordination by same.

B. Before starting any work, examine existing conditions and thoroughly check all drawings, specifications, adjoining or underlying conditions in which the work of this section is to be performed, and all dimensions.

C. Report in writing to the Architect any and all conditions which may interfere with or otherwise affect work of this section.

D. Seeding operations shall be conducted under favorable conditions during the next season or seasons which are normal for such work as determined by accepted practice in the locality of the Project.

1.05 PROTECTION OF WORK

A. Landscaped areas shall be protected by the Contractor against traffic damage, erosion, or other use by erecting barricades or temporary fencing immediately after seeding is completed and by placing warning signs of a type approved by the Architect on various areas. These barricades, or temporary fencing, and signs shall be maintained until the lawns are well established.

B. The Contractor shall maintain all seeded areas without additional payment until the expiration of the maintenance period. Any areas that fail to show a uniform stand of grass will be reseeded and re-fertilized at the Contractor's expense, until an acceptable stand of grass is established.

C. Upon final acceptance of the work specified herein, the Contractor shall remove all barricades or temporary fences.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Topsoil: Stockpiled topsoil may be used, provided it meets the requirements of these specifications. Additional topsoil from certified off-site sources shall be used, provided it meets the requirements of these specifications. Topsoil for lawn and planting operations shall be fertile, friable, natural loam containing a liberal amount of humus. It shall be free of admixtures and subsoil and shall be reasonably free of noxious weed, seed, lumps, plants, or their roots, and completely free of stones, sticks, and other extraneous matter, and shall not be used for planting operations while in a frozen or muddy condition. After spreading to a uniform depth of 6" minimum, all topsoil shall be raked to remove all extraneous matter. Raked topsoil shall conform to the mechanical analysis specified below and shall be free of stones, lumps, plants or their roots, sticks and similar debris, or any other undesirable material. Topsoil shall not be used in a muddy or frozen condition.

1. All topsoil to be furnished shall be subject to the approval of the Architect. Furnish a certified analysis, made by a recognized authority, of any topsoil that may have to be furnished to complete the work of this section. Test reports shall match the format listed below.

2. Topsoil shall have an acidity range of pH 5.0 to 7.0 and shall contain not less than 6 percent organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees centigrade. The mechanical analysis of the soil shall be as follows:

Passing	Retained On	Percentage
1" screen		100%
1" screen	¼" screen (gravel)	Not more than 3%
¼" screen	No. 100 USS mesh sieve (sand)	40%-60%
#100 USS	(Very fine sand, silt & clay)	40%-60%

3. Topsoil in which more than 60 percent of the material passing the USS No. 100 mesh sieve consists of clay as determined by the Pouyoucous hydrometer or by the decantation method, shall not be used. All percentages are to be based on dry weight samples. The chemical and mechanical analysis shall state the above items in correct quantities.

4. The Architect reserves the right to take samples of the topsoil from time to time, whether delivered to or stored at the site. These samples will be analyzed for comparison with the

Specifications. Should tests show that topsoil does not comply with the Specifications, the material may be rejected or such other remedy made as approved by the Architect in the form of the addition of humus or other supplemental materials.

5. The topsoil mixture materials shall be thoroughly mixed by hand or by rotary mixer to the satisfaction of the Architect.

B. Sand: Sand shall be ASTM C-33 concrete sand. The sand shall have a fineness modulus of 2.5-3.2 and a coefficient of uniformity of less than 4.

C. Ground Limestone: Ground Limestone (calcium carbonate) shall have the following analysis: at least fifty (50) percent shall pass a 200 mesh sieve; at least ninety (90) percent shall pass a 100 mesh sieve; and one hundred (100) percent shall pass a 10 mesh sieve. Total carbonate shall not be less than eighty-five (85) percent for purposes of calculation, total carbonate shall be considered as calcium carbonate.

D. Organic Fertilizer: Organic fertilizer shall be used for surface application after grass has germinated. Organic activated fertilizer shall contain the following percentage by weight: 5% minimum of nitrogen, 45% phosphoric acid, and other nutritious basic elements.

E. Chemical Fertilizer: Commercial fertilizer shall be used for initial preparation and shall conform to the applicable state fertilizer laws. Commercial fertilizer shall be a complete fertilizer and shall be an organic based product suitable for the establishment of the turf and grass species described herein and/or as noted on the Contract Plans. Examples of acceptable products and Suppliers/Manufacturers are: *PRO-GRO* by *North Country Organics* of Bradford VT., Ph. (802) 222-9661; *LAWN BOOSTER* by *Organica Inc*. of Norristown PA., Ph. 1-888-24GREEN, or locally at (631) 544-0348.

1. Application rate, sequence, and methods shall be as recommended by the manufacturer based on soil conditions of the areas of installation as tested by the Contractor, and on the intended grass stand character (i.e. turf area). The Contractor shall coordinate the review of the recommendations between the Architect, the Manufacturer, and the Contractor's Installer. Commercial fertilizer application shall be properly coordinated with the application of any other soil amendments that may be necessary.

F. Humus / Compost: Humus shall be of native type and consist of reed peat or sedge peat, but not peat moss, and of such physical condition that it can be readily incorporated with topsoil. It shall be free from sticks, stones, weedy roots, glass or toxic substances or other foreign matter. When delivered from stock piles, humus shall contain between 35 percent and 50 percent moisture. Use only natural domestic humus suitable for soil mulch and of such composition as to furnish ample water holding capacity and retention of plant food. Humus shall be dark brown to black in color, granulated, free of weed seed and lumps and show analysis as follows:

1. 25 percent - 45 percent moisture by weight as delivered from stockpile.
2. 5.0 - 7.5 pH (acidity).
3. Minimum 300 percent water absorbing ability (oven dried at 100 C.).
4. 85 percent minimum organic matter on dry basis (samples dried at 65 C.).
5. Low in content of wood material, suphur, iron, or other heavy metals.
6. Ash, on dry basis: not more than 10 percent.
7. Soluable salts less than 4.0.
8. Solvita Maturity number between 6 and 8.
9. Carbon / Nitrogen ratio - greater than 30:1.
10. Particle size shall pass a ¼" screen.
11. Low phosphorous and nitrogen content.

Humus shall be obtained from fresh water site, conditioned in storage piles after excavation for at

least 6 months, including one freezing, thawing period.

Certification and Testing: The Contractor shall submit a certificate of materials regarding the composition of the compost from a certified Seal of Testing Assurance Program, Compost Testing Program Laboratory. The test shall be for the actual material to be used on the project, from the stock piles. Stock piles of this material shall be visited by the Landscape Architect, with all expenses paid for by the Contractor.

One such laboratory is located on Long Island:

SOIL FOODWEB NEW YORK, INC.
555-7 Hallock Avenue
555-8 Port Jefferson Station, NY 11776
Phone: (631) 474-8848
Fax: (631) 474-8847
info@soilfoodwebnewyork.com

G. Mulch: Weyerhauser “Silva-Fiber”, or equal, available from American Excelsior Corporation, Chicago, Illinois.

H. Erosion Control Blanket: Use “Ero-Mat, standard”, as manufactured by Verdyol and distributed by Erosion Control Systems, Inc., Tuscaloosa, Alabama; (1-800-942-1986). Install with 11 gauge or heavier steel wire staples with 6 inch long legs and a 1 inch crown. Note: “Ero-Mat, High Velocity” for use on slopes greater than 3:1 and 60 ft. long; or in areas where a high velocity of water is expected - duration is 4-1/2 to 5 feet/second range (in swales).

I. Water for Turf Establishment: Water suitable for turf establishment will be available on-site to the Contractor as coordinated with the Owner. The Contractor shall provide all devices required for the distribution of water (provided by Owner) until turf is fully established. If an irrigation system has been installed or is already in place, this shall serve for distribution. The proper amount and frequency of watering will be the responsibility of the Contractor. In general terms, during dry weather, grassed areas shall be watered daily with sprinklers until grass is firmly rooted.

J. Grass Seed: The Contractor shall furnish and place all materials required for seeding in all topsoiled areas. The seed used shall be fresh, re-cleaned seed of the latest crop, mixed in the following proportions by weight, and meeting the following standards of pure live seed content. The tolerance for PLS (purity x germination) shall be those called official and tabulated on page 5, US Department of Agriculture Bulletin No. 480.

Grass seed mixes shall be as noted below. Submit mix percentages for approval. Percent pure live seed (PLS) shall be 95% minimum. Maximum percent weed seed shall be .50%. Germination shall be 85% or better.

All seed shall be delivered in the original packages, unopened, which shall include a guaranteed analysis by the vendor. The seeds shall be pre-mixed prior to delivery to the job site, or as otherwise directed by the Architect. The grass seed shall be of the latest crop, mixed in the following proportions by weight:

70% - Tall Fescue
20% - Turftype Ryegrass
10% - Kentucky Bluegrass

All seed shall exhibit minimum 98% Purity and minimum germination of 90%.

Unless specifically indicated otherwise above, the following varieties of turfgrasses shall include:

Tall Fescue: Rebel, Falcon, Mustang, Jaguar, Houndog.
Turftype Ryegrass: Manhattan II, Prelude, Palmer, Omega, Regal.
Kentucky Bluegrass: Eclipse, Adelphi, Glade, Sydsport, Baron.

The rate of seeding shall be as recommended by the supplier/manufacturer for the type of seeds used in the mix and the intended purpose of the planted area. The intent of the Restored Lawn Area seeding is to provide turf lawn to blend in with the areas adjacent to the disturbed area being planted. Supplier shall coordinate the final rate with the Architect, who shall have final authority for approval. Grass seed shall be sown in the fall from August 25 to October 1, or in the spring, between March 15 and May 1. Seeding shall be done in dry or moderately dry soil, and at times when the wind velocity does not exceed 5 mph.

Sowing of Seed: Immediately before any seed is to be sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of uniformly-fine texture. Lawn areas shall be seeded evenly with a mechanical spreader, at a rate of 10.0 pounds to 1,000 sq.ft. of ara, lightly raked, rolled with a 200 pound roller and watered with a fine spray. The method of seeding may be varied at the discretion of the Contractor to establish a smooth, uniform turf composed of the grasses specified. Re-seeding shall be done in accordance with this procedure.

Grass seed shall be sown in three different passes by approved machine in such a manner that a uniform stand will result. After seeding, the surface shall be evenly raked with a fine toothed rake and rolled with an approved roller, as directed by the Architect. Seeding by hydraulic means may be used if approval is obtained from the Architect.

1. The mixture of grass seed from which the sod was grown shall consist of approximately the following mixture of permanent grasses: 70% Tall Fescue, 20% Turftype Ryegrass, 10% Kentucky Bluegrass - or - 50% shade tolerant Kentucky Blue Grass - 20% Manhattan II Rye Grass - 30% Pennlawn Fine Fescue (blend as selected by the Architect). All sod shall be inspected prior to delivery.

2. Sod shall be harvested, delivered and transplanted within a period of 36 hours. Before cutting, sod shall be mowed uniformly at a height of 1-1/2 inches.

3. Strength of Sod Sections: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section.

4. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.

5. Thatch: Sod shall be relatively free of thatch up top ¼ inch allowable (uncompressed).

6. Diseases, Nematodes and Insects: Sod shall be reasonably free of diseases, nematodes and soil-borne insects.

7. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than two (2) such plants are found per 200 s.f. of area. Sod will not be acceptable if it contains any of the following weeds: common Bermuda grass (wire-grass), quackgrass, johnsongrass, poison ivy, nutsedge, niblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel and bromegrass.

8. Architect/Engineer may inspect the sod before it is harvested, but reserves the right to reject, on or after delivery, any sod which in his opinion does not meet with the specification requirements.

K. Rootzone Mix Ratio: The rootzone mix shall utilize all existing topsoil stockpiled and shall incorporate an additional 3" of sand and 1" of compost at no additional cost to contract.

L. Topdressing: The entire portion of the field not being repaired for low spot filling shall receive a full ½" of topdressing using organic matter which shall be a mature, stable compost with an organic matter content of 6-8% and be free of glass or toxic substances. This material is available from *Agresource*, called *Agresoil Compost*, and is made from bio solids, not leaf mold. Contact number: 1-800-313-3320.

M. Overseeding: Overseeding shall be accomplished by a drill seeder in three different passes using the following seed mixture:

Percent	Turfgrass Species / Variety	Min. Purity %	Germ. %
70%	Tall Fescue	98%	90%
20%	Turftype Ryegrass	98%	90%
10%	Kentucky Bluegrass	98%	90%

Acceptable varieties of each turfgrass shall include:

Tall Fescue: *Rebel, Falcon, Mustang, Jaguar, Houndog*.
Turftype Ryegrass: *Manhattan II, Prelude, Palmer, Omega and Regal*.
Kentucky Bluegrass: *Eclipse, Adelphi, Glade, Sydsport and Baron.*

Rate of seeding shall be 10 lbs. per 1,000 sq.ft. pf pure live seed (pls.).

PART 3 – EXECUTION

3.01 STRIPPING TOPSOIL

A. All topsoil shall be stripped as described and stockpiled for reuse. No topsoil is to be removed from the site.

3.02 GRADING AND SUBGRADE PREPARATION

A. Perform grading operations to bring subgrade to levels required and to contour indicated on the drawings.

B. Completed subgrade shall be approved by the Architect/Engineer before topsoil and sodding.

C. The approved subgrade shall be scarified to a depth of 2 inches to permit mixing with rootzone material.

D. Where work involved is not in an area designated for regarding, the existing grade shall be rototilled to a depth of 8 inches. The area shall then be leveled and stones raked out.

3.03 ROOTZONE / SEED BED PREPARATION

A. See Specification Section 329200 – Turf and Grasses

3.04 SEEDING OPERATIONS:

A. General:

1. Furnish all materials required for seeding lawn areas in topsoiled areas.

2. Prior to seeding operations, all areas to be seeded shall be thoroughly disked or otherwise loosened to a depth of 4 inches and shall be carefully raked to true lines free from all unsightly variations, bumps, ridges or depressions, brought to finished grade elevations as shown on the drawings. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Two pounds of 15-20-10 formula commercial fertilizer per cu.yd. shall be thoroughly mixed with the topsoil or not less than 10 lbs. per 1,000 sq.ft. of lawn surface, whichever is the greater.

3. Seeding:

    a. Purpose: To provide permanent vegetative cover and to control storm water run-off and erosion.

    b. Where Applicable: All areas not covered by buildings and pavement within the limit lines as shown on the contract plans, and all other existing lawn areas disturbed or damaged by the work of this contract.

4. All areas to be seeded in lawn shall be thoroughly disked or otherwise loosened to a depth of four (4) inches and shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. As specified, all sticks, stones, roots or other objectionable material that might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Ground limestone, humus and commercial fertilizer shall be applied as specified:

5. Apply ground limestone uniformly at a minimum rate of 100 pounds per 2,000 square feet, or as determined by analysis. The ground limestone shall be distributed evenly, by machine, over all areas to be seeded. It shall be worked lightly into the top three (3) inches of the soil, at least five (5) days before applying fertilizer.

6. Apply fertilizer uniformly at a minimum rate of 10 pounds per 1,000 square feet. Fertilizer to be 10-10-10. Apply humus at the rate of 3-1/3 cubic yards per 1,000 square feet. Note: Application rate, sequence, and methods shall be as recommended by the manufacturer based on soil conditions of the areas of installation as tested by the Contractor, and on the intended grass stand character (i.e. turf area). The Contractor shall coordinate the review of the recommendations between the Architect, the Manufacturer, and the Contractor’s Installer. Commercial fertilizer application shall be properly coordinated with the application of any other soil amendments that may be necessary.

7. Work lime, fertilizer and humus into soil to a minimum depth of 3 inches using any suitable equipment.

8. The soil shall then be raked to a smooth, even draining surface and properly set and compacted to establish uniform lawn/grass growth with an approved roller or as otherwise directed by the Architect. Manipulate to form, after settlement, smooth draining grades as shown on the drawings. Any depressions which occur shall be re-graded and re-rolled until a satisfactory grade is obtained.

9. Time of Seeding: Grass seed shall be sown preferably in the fall between August 15th and October 1st or in the spring between April 1st and May 15th, or at such other times as are approved by Owner's Representative. All seeding is to be done in dry, or moderately dry soil and at times when the wind does not exceed a velocity of five miles per hour.

10. Seed shall be sown at the rate as recommended by the supplier/manufacturer for the type of seeds used in the mix and the intended purpose of the planted area. The intent of the Restored Lawn Area seeding is to provide turf lawn to blend in with the areas adjacent to the disturbed area being planted. Supplier shall coordinate the final rate with the Architect, who shall have final authority for approval. Grass seed shall be sown in the fall from August to October, or in

the spring, between March and May. Seeding shall be done in dry or moderately dry soil, and at times when the wind velocity does not exceed 5 mph. Grass seed shall be sown by approved machine in such a manner that a uniform stand will result. After seeding, the surface shall be evenly raked with a fine toothed rake and rolled with an approved roller, as directed by the Architect. Seeding by hydraulic means may be used if approval is obtained from the Architect.

B. Hydroseeding Option: The Contractor may utilize a hydroseeding option, as indicated above. If hydroseeding shall be supplied as a zero-cost option to the Owner, the Contractor shall supply the name, address and contact information of his hydroseeding subcontractor to the Architect for contact and discussion. The hydroseed blend to be submitted by the Contractor shall be equal and comparable to the standard seed blend(s) indicated within this specification section for the intended turf establishment. The blend shall be submitted to the Architect in advance as a part of the shop drawings submittal process.

3.05 MULCHING:

A. All seeded areas shall be covered with approved mulch not later than 3 days following seeding. Ground surfaces shall be completely covered at the rate of at least 2 tons an acre. The Contractor shall utilize a Bowie Hydromulcher or equal to apply all mulch.

B. All areas to receive permanent seeding shall be mulched as described in the specifications and as noted herein.

C. On slopes 4 horizontal to 1 vertical, or greater, and in drainage swales, mulch shall be anchored using erosion control blanket or other approved netting properly fastened in place. Install rolls in proper direction with overlap and staple pattern set in accordance with the manufacturer's requirements.

D. In any event, the Contractor is responsible for mulch remaining intact until grass has germinated and has reached a minimum height of one inch.

3.06 WATERING

A. The Contractor shall be responsible for the proper watering for all sodded areas until Substantial Completion of the work as hereinafter specified. The proper amount and frequency of watering will be the sole responsibility of the Contractor.

B. In the absence of adequate rainfall, watering shall be performed daily during the first week, and shall be sufficient to maintain moist soils to a depth of at least 5 inches. Water should be applied immediately if at any time the sod shows indications of wilting.

C. Subsequent Watering: Sod shall be watered as required to maintain adequate moisture in the upper 5 inches of soil. In the absence of rainfall, sod shall be watered at frequencies dictated by need.

3.07 CLEAN-UP

A. Soil, manure, peat or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean. Upon completion of the planting, excess stones and debris, which has not been previously cleaned up, shall be removed from the site or disposed of as required by the Architect, except topsoil shall be spread or piled on the site as directed by the Architect. Lawns and planting areas shall be prepared for final approval.

3.08 MAINTENANCE, REPLACEMENT, GUARANTEE AND FINAL INSPECTION:

A. Maintenance operations shall begin immediately after the seed is sown/sod installed and shall be continued as required until Substantial Completion. Grass shall be kept in healthy growing condition by mowing, watering, weeding, cultivating, disposal of waste vegetation, fertilizing, spraying or spreading of approved materials to prevent or treat infestations of insects or disease and all other operations required to produce and maintain a strong, vigorous and healthy stand of grass. Lawn areas shall be mowed to a height of 2 inches whenever the average height of grass is over 3 inches. When the amount of cut grass is heavy, it shall be removed to prevent the destruction of the underlying turf.

B. Seeded or sodded areas that are determined to be dead within warranty period, or in the opinion of the Architect, in an unhealthy, unsightly, or badly impaired condition, shall be replaced by the Contractor as soon as reasonably possible after the unsatisfactory condition has been evident. No replacement shall be made in any season definitely unfavorable for seeding or sodding. Such replacements shall be made in the same manner as specified for the original seeding or sodding.

C. Seeded Lawns: Seeded lawns shall be protected and maintained by watering, mowing and replacing for 60 days or as long as may be necessary to produce a uniform stand of grass. After grass is up, it shall be top-dressed with organic lawn fertilizer. Maintenance shall continue until a uniform turf is established. For the purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than one square foot, will be allowed up to a maximum of 3 percent of the lawn area. Areas not meeting this requirement will be reseeded.

D. Surface Application of Fertilizer: Spread a second application of organic lawn fertilizer at the end of the maintenance period for both seeded and sodded lawns. Spreading rate shall be as recommended by the manufacturer.

    1. Sodded Areas: Use 18-5-9 or 12-4-8.
    2. Seeded Areas: Use 18-5-9 or 24-6-8.

        a. The second application of fertilizer shall be witnessed by the Owner or his representative, and a signed document shall be submitted to the Architect certifying the Work has been performed. The document shall be signed by the installer and the Owner's or Architect's witness.

E. Provide labor and equipment for maintenance, including the necessary watering and mowing equipment to meet the requirements herein established.

    1. The Owner will furnish the water used to maintain the lawns as specified.

F. Turf must have had a minimum of three (3) mowings before a request for acceptance can be considered.

G. Initial inspection of the seed or sod work to determine Substantial Completion of the work will be made by the Architect upon written notice requesting such inspection submitted by the Contractor at least 10 days prior to the anticipated date of inspection. Request may be made subsequent to the third mowing of the turf.

H. Acceptance: After inspection, the Contractor will be notified in writing by the Architect/Engineer of Substantial Completion of all work, or, if there are any deficiencies, of the requirements for completion of the work. Work remaining to be done or redone will be subject to re-inspection before Substantial Completion is given.

I. All seeded and sodded areas shall be guaranteed for a period of one full year / one complete growing season, commencing with the date of Substantial Completion.

J. Upon Substantial Completion, the Owner will assume general responsibility for maintenance of the lawn areas. The Contractor shall, however, make monthly visits to the site during the guarantee period to advise the Owner of proper maintenance procedures. No additional payment shall be made for visits. Price bid for the work of this trade shall include costs of visits.

K. Failure of the Contractor to notify the Architect/Engineer, in writing, of inadequate maintenance by the Owner of the lawn areas installed under this contract shall constitute acceptance of the Owner's maintenance operations by the Contractor. The Contractor shall not, therefore, use the Owner's alleged lack of proper maintenance as a basis for voiding his responsibilities under the guarantee herein specified.

L. At the expiration of the guarantee period, upon written request of the Contractor, inspection for Final Acceptance will be made by the Architect/Engineer. All remedial work to turf areas by the Contractor shall be completed prior to the request for Final Acceptance.

3.09 GUARANTEE / REPLACEMENT

A. The Contractor guarantees, by acceptance of the Contract that all work installed will be free from any and all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified. If, during the period of one (1) year, or as otherwise specified, from date of the certificate of completion and acceptance of the work, should any defects in workmanship, material or performance appear, he will, without cost to the Owner remedy such defects within a reasonable time to be specified in writing by the Architect. In default thereof, the Owner may have such work done and charge cost to the Contractor.

B. The Contractor shall provide the Architect a written guarantee covering fully the one (1) year guarantee period. Lawns shall be warranted for the minimum duration of one full year, to include one full growing season after seeding and sodding, and shall be alive and in satisfactory growth at the end of the warranty period. The growing season is defined as beginning May 1 and ending October 1.

C. At the expiration of the guarantee period, upon written request by the Contractor, inspection for Final Inspection will be made by the Architect. All remedial work to seeding by the Contractor shall be completed prior to the request for final inspection. If lawns do not show a healthy, uniform stand of grass, those areas shall be re-seeded or re-sodded as soon as conditions permit, but during the spring or fall seeding periods.

D. Owner's Responsibility: If an area of seeding or sodding during the warranty and replacement period is found to be damaged or destroyed due to vandalism, malicious mischief, vehicle ruts and tracks, or acts of God such as flooding, storm debris, etc., then the Owner shall have the responsibility of replacing those lawn areas without cost or responsibility to the Contractor.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 329300 – PLANTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Supplementary General Conditions", which form a part hereof whether attached hereto or not.

1.02 RELATED SECTIONS

A. The work must comply with the requirements of the following related specifications sections:

1. Section 013563 “LEED Requirements” for additional LEED requirements (For LEED Certified Projects)
2. Section 017419 “Construction Waste Management” for recycling construction waste (For LEED Certified Projects)
3. Section 310000 – Earthwork
4. Section 312500 – Erosion and Sediment Controls
5. Section 322700 – Site Furnishings

1.03 SCOPE OF WORK

A. Planting required for this Work is indicated on the Plans and includes furnishing and planting all trees, shrubs, hedges and ground cover throughout the Work. Work shall also include, but not be limited to: Tree Staking, Mulching, Maintenance, warranty and replacement of plants, aluminum edgings, weed barrier, finish grading of associated planting areas, providing and preparing soil and soil mixes per agronomic soil test recommendations. Under this item, the Contractor shall excavate all tree pits included and shall furnish, plant, and maintain all plant materials specified or as directed by the Architect. The Contractor shall be liable for any damages caused by planting and/or transplanting operations and all areas and construction disturbed shall be restored in their original condition to the satisfaction of the Architect. Any plantings that do not establish themselves during the warranty period shall be replaced at no additional cost to the Owner.

1.04 REQUIREMENTS AND QUALITY ASSURANCE

A. Each plant supplied shall be as designated in the Landscape Schedule which is shown on the Contract Drawings.

B. Plant names shall agree with nomenclature of "Standardized Plant Names", as adopted by the American Joint Committee on Horticultural Nomenclature, current edition, size and grading standards shall conform to those of the American Association of Nurserymen (AAN) unless otherwise specified. No substitution shall be permitted except by written permission of the Architect upon adequate documentation in writing from three (3) sources of the unavailability of material specified.

C. The quality of all plants shall be typical of their species or variety, and in accordance with American Standards of Nursery Stock – ANSI Z60.1-latest version by AAN. They shall have normal, well developed branches and vigorous root systems. Each tree or shrub shall show a normal habit of growth, and show no physical damage. They shall be free of fibrous defects, disfiguring knots, sun-scaled injuries, abrasions of the bark, plant diseases, insect eggs, bores and all forms of infestations. All plant shall be nursery-grown unless otherwise stated; they shall have been growing under the same climatic conditions as the location of this project for at least two years prior to date

of planting on this project. They shall conform to the dimensions specified, and shall present a balanced proportion of height and spread for the particular specimen desired. The Contractor may be required to certify to the patented varieties of trees specified in this Contract.

D. The work of this section shall include the cost of excavating plant pits, including disposal of excess subsoil, installation of a porous weed barrier, furnishing plants, transplanting plants, digging and transporting trees from nurseries, furnishing and placing topsoil for pits, inspecting, planting, pruning, staking, guying, anchoring, wrapping, watering, restoration, replacement of nursery stock which does not establish itself in conformance with warranty requirements, and maintaining all trees, incorporating super-phosphate with the topsoil, distribution fertilizer over plant pits and all other work, incidentals thereof, in accordance with the specifications to the satisfaction of the Architect.

E. Inspection of Plant Materials:

1. All plants shall be subject to inspection at any time and place. Inspections desired by the Contractor, if approved, shall be at the expense of the Contractor. All trees and shrubs shall be subject to inspection and approval and marking at the growing site, but approval and marking at the growing site shall not obligate the Owner to pay for any tree or shrub until it has been delivered and planted at the planting site in a satisfactory condition. The Contractor shall be represented at all inspections. The Architect reserves the right and option to place seals on plant materials selected. Selection and/or tagging shall not constitute final acceptance nor preclude the right of rejecting plants not fully meeting the requirements of the Specifications.

2. The Architect reserves the right to identify by suitable non-injurious means, such as painting, marking by various methods, etc., all plant material rejected upon delivery to the contract site.

3. All plants are subject to inspection and approval at point of origin. To this effect, when requested by the Architect, the Contractor shall designate the plant material at the nursery that is to be planted in this Contract in the presence of the Architect. The Architect shall, at his option, tag each plant selected. Plant material not meeting specification requirements will be rejected at the nursery, and material tagged at the nursery arriving untagged at the site will also be rejected. No tags shall be removed until after planting.

4. Plant material shall be subject to inspection upon delivery to site, tagging not withstanding. No plant material shall be planted until inspected and approved. Any rejected plant material shall be immediately removed from the site and replaced with acceptable plant material at no additional cost to the Owner. The removal of nursery stock rejected at the planting site shall be at the expense of the Contractor and replacement in compliance with specifications shall be made at no extra cost to the Owner. The Owner reserves the right to inspect and tag plant materials for replacement which have died during the maintenance and guarantee period. The above standards shall apply.

F. Plant Material Replacement: The Contractor shall replace in accordance with the Contract Plans and Specifications any plant material that are dead or, in the opinion of the Architect, are in an unhealthy or unsightly condition, and/or excessive pruning, inadequate or improper maintenance, or other causes, by the date of one (1) year after the final acceptance and completion of the whole work of this Contract.

1. Where vandalism is agreed by the Architect as the cause for replacement, the Contractor shall not be responsible for replacement during the guarantee period after Final Acceptance.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's current product literature for each manufactured product specified herein. Include maintenance instructions recommending procedures to be established by

the Owner for maintenance of landscaping during an entire year.

B. **LEED Submittals: (For LEED Certified Projects) Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.06 PRODUCT HANDLING AND DELIVERY

A. For delivery, all plants shall be packed, transported, covered when delivered in open trucks, and handled with utmost care to insure protection against injury. During shipment they shall be protected by tarpaulin, burlap or other suitable covering so as to prevent dehydration. The tops of trees and shrubs shall be tied in with heavy twine to protect branches from being broken during loading, shipping and unloading. Each shipment shall be certified by State and Federal authorities to be free from disease and infestation. All balls of the trees or shrubs delivered to the site in a loose, broken or dried condition will be rejected.

B. Any inspection certificate required by law to this effect shall accompany each shipment invoice or order of stock. On arrival, the certificate shall be filed with the Architect. Balled and burlapped plants shall be set on the ground and the balls covered with moist soil, mulch or other protection from drying winds and sun. Until planted, all plant material shall be properly maintained to the satisfaction of the Architect. Water as required to maintain good health and growth. Protect all plant materials (either in place, or awaiting planting)from freezing.

C. Plants delivered to the contract site shall be planted within 72 hours from time of delivery. All others will be rejected and promptly removed from the site. If, due to no fault of the Contractor, he is unable to plant in a specified area, such as other Contractor's operations, wet soil conditions, or inclement weather, the Contractor shall take the necessary steps to heel in the plant material with wood chips or salt hay, to the satisfaction of the Architect. Any bare-rooted plants shall be planted or heeled-in immediately upon delivery. Planting of delayed areas shall proceed as soon as acceptable conditions present themselves.

1.07 MEASUREMENT

A. Measurement of sizes for various trees shall be in accordance with those specified in the publication "*American Standard for Nursery Stock*" by the *American Association of Nurserymen, Inc*., 230 Southern Building, Washington, DC 20005, approved as USA Standard Z60.1-1973 by American National Standards Institute, Inc., latest edition.

1.08 ABBREVIATIONS

A. Cal. - indicates the caliper of the trunk of the tree.

B. B.R. - indicates plants to be dug out with bare roots.

C. B&B - indicates plants to be balled and burlapped.

D. C.G. - indicates container-grown plants.

PART 2 - MATERIALS

2.01 PLANT MATERIAL

A. Each plant supplied shall be as designated in the Landscape Schedule and meeting the description under Standards of this Specification. For measurement purposes, a plant shall be dimensioned as it stands in its natural position. Trees shall be calipered six (6) inches above ground. Stock

furnished shall be a fair average of the minimum and maximum sizes specified. Large plants cut back to size specified will not be accepted.

B. Locate plants as shown on the Contract Drawings, except where obstructions below ground or overhead are encountered or where changes have been made in the construction. Make necessary adjustments only after approval of the Architect. Place no planting, except ground cover and vines, closer than 2 feet to pavements or structures.

C. Furnish quantities necessary to complete the planting as shown and located on the Contract Drawings. The Contractor may, at his option, elect to furnish items designated as alternates in the Plant List, provided that matched plantings are used where shown. In the event that alternatives are to be used, the Contractor shall so notify the Architect in writing and receive written approval from the Architect prior to delivery.

D. All plants shall have a habit of growth that is normal for the species and shall be sound, healthy, vigorous and free from insect pests, plant diseases and injuries. Plants shall equal or exceed the measurements specified in the Plant List, which are the minimum acceptable sizes. They shall be measured before pruning with branches in normal position. Necessary pruning shall be at the time of planting. Requirements for the measurement, branching, grading, quality, balling and burlapping of plants in the Plant List generally follow the code of standards currently recommended by the American Association of Nurserymen, Inc. in The American Standard for Nursery Stock.

E. Trees shall have straight trunks with the leader intact, undamaged, and uncut. Old cuts and abrasions shall be completely calloused over. Branching must be well-developed and not one-sided.

F. Plants are subject to observation for quality, size and color. Plants which are weak, sick or lacking compact and proper proportions will not be accepted. Plants shall not be pruned prior to delivery.

2.02 FERTILIZER AND SUPERPHOSPHATE

A. Superphosphate (18% - 20% phosphorous acid) shall be incorporated with the topsoil at the time of planting, at the following rates:

Two (2) pounds per 1" of caliper of tree.
One (1) pound per two (2) feet height of shrub.
Twenty (20) pounds per 1,000 square feet of ground cover bed.

1. Just prior to mulching of the plant materials, fertilizer (10-10-10, 50% organic nitrogen) shall be evenly distributed over the plant pit at the rate of one (1) pound per 1" of caliper of tree, one-half (1/2) pound per two (2) feet height of shrubbery and twenty (20) pounds per 1,000 square feet of ground cover bed.

2. Fertilizer shall be stored as required in such a manner that its effectiveness will not be impaired.

3. No fertilizer shall be delivered to the site until it is approved by the Architect, but such approval does not constitute final acceptance. The Architect reserves the right to reject on or after delivery any material which does not, in his opinion, meet these specifications. The bid shall include furnishing and delivery of the samples to approved Testing Laboratories, if required.

2.03 WOOD CHIP MULCH

A. Wood chips shall be obtained from green hardwood and shall be 1/8 inch nominal thickness with fifty (50) percent having an area of not less than one (1) square inch nor more than six (6) square inches and shall be free of leaves, twigs, shavings, bark and any foreign materials which are injurious to plant growth.

2.04 STAKING

A. Trees will not be staked unless directed so by the Architect; refer to Contract Drawings for specific staking requirements. If site conditions warrant staking in the opinion of the Architect, a double stake system that allows the tree to stand straight free of any support and allows flex of the tree due to any natural horizontal forces with return to its original vertical position will be used. This system shall be similar or equal to the "*Ready Stake System*" as manufactured by *Decorations for Generations*, 2224 So. Daubenberger Road, Turlock, California 95380, phone 1-888-333-3090; or approved equal. Refer to 3.02 for related information.

2.05 TOPSOIL

A. The topsoil shall consist of a fertile, friable, natural topsoil of loamy character, from the "A" Horizon without a mixture of subsoil, uniform in quality and shall be free from refuse of any nature, hard clods, sods, hard pan, pebbles larger than ¾ inch in diameter, coarse sand, noxious weeds, sticks, brush or other rubbish. Topsoil shall conform to all plan notes, specifications, and Town, Village or other Agency with jurisdiction, requirements. Topsoil used in planting shall be included in the price bid for the plant and at no additional cost to the Owner.

B. The topsoil shall contain not less than five (5) percent nor more than twenty (20) percent organic matter, as determined by loss on ignition of oven-dried samples.

C. The pH value of all topsoil shall be not less than five (5) and not more than seven (7). If, after testing samples of material, obtained from any source inside or outside the contract limits, the topsoil is found to be unsatisfactory for the intended use, the Architect may require that the Contractor, without additional compensation, add to the topsoil proposed by him for use, lime, particular fertilizer or particular humus, as directed, in order to make the topsoil suitable.

The sieve analysis of an oven-dried sample washed past the 100 sieve shall be as follows:

SIEVE SIZE	PASSING
1"	100%
¼"	80 to 100%
#100	40 to 60%

2.06 WRAPPING

A. Major tree trunks (in excess of 2" caliper) shall be securely wrapped with a six (6) inch new burlap bandage, securely tied at the top and bottom, and at two (2) foot intervals along the trunk of the tree, or krinklekraft paper from the bottom to the height of the lowest branches. Provide fifty (50) percent overlap with wrapping material. Both burlap and wrapping paper shall be securely tied with ties. Burlap shall be maintained in place until the end of the Guarantee Period, at which time it shall be removed by the Contractor.

2.07 EDGING

A. Edging to be one of the following:

1. Aluminum edging is to be 3/16 inch by 5-1/2 inch, complete with all stakes and connectors. Finish is to be electrostatically-applied enamel acrylic (baked-on paint); color is to be black. The following manufacturers are acceptable:

   a. "Black Dura-Flex" as manufactured by Permaloc Corp., phone: 1-800-356-9660.
   b. "Deco-Black" finish as manufactured by Curve-Rite Aluminum Edging; phone: 1-800-366-2878.
   c. "Sure-Loc Aluminum Edging" as manufactured by Sure-Loc Corp., Holland, Michigan;

phone: 1-800-787-3562.

2. Steel edging as manufactured by Ryerson Steel, subsidiary of Inland Steel Industries, Inc.; ¼ inch x 5 inches, allowing for 8 inch overlap, complete with 15 inch tapered steel stakes at 30 inches on center. Color as selected by the Architect.

PART 3 - EXECUTION

3.01 PLANTING

A. Time of Planting: Unless otherwise directed by the Architect, conduct planting operations under favorable weather conditions during the next season or seasons which are normal for such work as determined by accepted practice in the locality of the Project. Seasons for these plantings are: Spring planting – March 10 through May 10; Fall planting - August 20 through November 30. Upon written request by the Contractor to the Architect, an extension of the deciduous planting season for winter planting may be granted. Extension will be determined by the genus of trees to be planted and soil conditions.

B. Prior to planting, the Architect may adjust the location of any trees in the field as necessary. The Contractor shall notify the Architect if relocation may be necessary prior to proceeding. In general, all plants shall stand, after settlement, at the same level at which they have grown. Care shall be exercised in setting the plant plumb. Ropes, stones, etc., shall be removed from the hole before backfilling, and all soil for backfilling shall be loose and friable and not frozen.

C. Plants shall be planted plumb at the same level at which they have grown unless otherwise specified on the drawings. The balls of earth of balled and burlapped plants shall not be loosened or otherwise damaged during planting operations. All large and fleshy roots which are bruised or broken shall be pruned with a clean cut before planting. The burlap shall be cut away from upper half of ball and remaining burlap adjusted to prevent formation of air pockets. Soil shall be firmed thoroughly and settled by tamping and watering.

D. In digging the trees and shrubs with a rootball, the minim lateral diameter of the rootball shall be as specified. The rootball shall be of sufficient depth to include all lateral roots. All roots encountered during digging operations shall be cut flush to the side of the ball with sharp loging or pruning sheers. The rootball shall be firm and compact, tightly and adequately bound with burlap wrapping. Platforms will be required for the balls over six (6) feet in diameter to assure solidity of the ball. If trees are unloaded by a bucket loader machine of sufficient size, platforms may be eliminated with the approval of the Owner's Representative. Under no circumstances shall the rootball be artificially manufactured to meet size requirements and none will be accepted in a loose, broken or lopsided condition.

E. All trees and shrubs required by the specifications or plan to be moved with ball and burlap will be measured across the minimum lateral diameter of the rootball. The rootballs shall be wrapped and laced as shown in the 1973 American Standard Nursery Stock. Rope shall be a minimum of 3-ply sisal or approved equal.

F. All trees and shrubs that are required by the specifications or plans to be dug bare root shall have all fine fibrous roots preserved. After digging, the bare root plants shall be puddled in a heavy mixture of clay, mud and packed with straw or salt hay, held in a moist condition until planted.

G. Backfill shall be one part peat, three parts topsoil mixture. To the topsoil used in backfilling tree pits, thoroughly incorporate commercial raw bonemeal as follows:

3 pounds for minor trees and shrubs
5 pounds for evergreen trees

5 pounds for major trees 2 to 3 inches caliper
7 pounds for major trees 3 to 4 inches caliper

All components shall be pre-mixed before backfilling and peat shall be thoroughly moistened before mixing.

H. Trees shall be placed in the proper position in the center of the pit after the soil in the bottom of the pit has been firmed. Loose, friable topsoil shall be worked in, firmed at intervals and thoroughly settled with water. Care shall be taken to avoid bruising or breaking the tree ball when tamping the soil. All large and fleshy roots which are bruised or broken shall be pruned with a clean cut before planting.

I. The Contractor shall be responsible for placing the proper variety of tree or shrub at the locations as shown on the plans or in the distribution schedule of the proposal. If an error is determined by the Architect as described above, the Contractor shall replace the tree or shrub with the proper plant in the next succeeding planting season and maintain and guarantee of that tree or shrub for 1 year from the date of replacement.

J. The Contractor shall be responsible for locating all utility lines including traffic conduits, LIPA/National Grid Energy Delivery installations, irrigation systems, etc. The Contractor shall be responsible for repairing all damage to utilities.

K. Size of Pits:

1. The pit diameter shall be twice the root spread for plants up to and including a two foot root spread; pit diameter equal to root spread plus two feet for root spread of two to four feet; pit diameter one and one half times the root spread for spread of roots over four feet. The depth of pits shall be adequate to permit a minimum of six inches of topsoil backfill under all roots or balls. Where subsurface obstructions are encountered, the Contractor shall restore the disturbed area to its original condition. A new pit location will then be designated by the Architect.

2. The above applies for spread of roots of bare root plant and balled and burlapped plants.

3. Larger pits may be required, if so specified in the plans or specifications.

4. When designated on the plans as a planting bed, the depth of the bed for shrubs shall be 18" deep and the bed for ground covers shall be 12" deep. Depth of beds shall be taken from surrounding existing grades.

5. In curb strip grass areas, the tree pits shall be a minimum of 48" long and the widths shall be from the back of the curbs to the edge of the sidewalk, or where room allows the width shall be a minimum of 48" wide.

6. Disposal of Excavated Materials: Excess topsoil and subsoil excavation from tree pits and planting beds shall be disposed of off the site by the Contractor. Existing topsoil shall not be used for planting unless so directed by the Architect.

3.02 RELATED OPERATIONS & GENERAL PLANTING PROCEDURES

A. All shrubs and groundcover shall be backfilled with topsoil as per the plans and specifications.

B. Any required staking shall be done immediately after planting and all stakes and wires shall be maintained for one (1) year after completion of the Contract. Plants shall stand plumb after staking. One month prior to end of guarantee period, the Contractor shall remove all stakes, guy wires and

wrapping from plant material unless otherwise directed by the Owner. Removal and disposal of such shall be at the Contractor's expense, and the cost, therefore, included in the contract bid price.

C. Wood chip mulch shall be placed in saucers at least as large as the holes in which trees and shrubs have been planted to a depth of three (3) inches. If plant beds are shown on the drawings, it is an indication that these beds be mulched with a minimum of (3") three inches of wood chip mulch and fertilized according to manufacturer's recommendations for shrubs and ground cover. Shredded hardwood mulch is acceptable in lieu of wood chip mulch.

D. All trees and shrubs shall be set plumb and at such a level that after settlement they are recessed four (4") inches below the existing grade, forming a natural saucer. All trees and shrubs shall be backfilled to the crown with topsoil, supplied as specified. Topsoil shall be thoroughly and properly settled by tamping and by watering.

E. The contract price for planting shall include the furnishing of all topsoil necessary for planting operations.

F. Watering: At the time of planting, the soil around each plant shall be thoroughly saturated with water. All plants including shrubs and groundcover shall be watered by the Contractor once a week between the periods of April 1 and October 1, unless otherwise directed by the Architect. Each watering should be sufficient to adequately soak the plant root system. The Contractor shall be completely responsible for the initial watering during planting and maintenance period watering until the project receives Substantial Completion status by the Architect. At the determination of Substantial Completion, the Contractor’s one-year warranty period is established, and the Owner assumes full responsibility for routine maintenance, including watering as required by field conditions.

G. Pruning:

1. Broken or badly bruised branches shall be removed with a clean cut. Each plant shall be pruned to preserve its natural character and in a manner appropriate to its particular requirements. In general, at least 1/3 of the wood of deciduous plants shall be removed by thinning or shortening branches but no leaders shall be cut. All pruning shall be done with clean, sharp tools. The pruning of all plants shall be done on the job site, or as otherwise specified or approved by the Owner's Representative. All plants pruned without previous approval shall be rejected.

2. Deciduous trees and shrubs shall be pruned to reduce the vegetative growth by 1/3 of its total branching. Wood removed shall be inferior branches, competing branches, crossing branches, and dead and damaged wood. The natural branching habit of the plant shall be adhered to at all times.

3. Trees used in street/open area tree plantings shall have all branches removed up to a height of seven (7) feet.

4. The center leader of all major trees will be straight, healthy and unimpaired in any way. Damaged leaders will not be acceptable.

5. Balled plants (B.B., B&B): shall be backfilled with topsoil carefully tamped around and under the base of each ball to fill voids. Platforms shall be removed. All burlap, ropes, etc., shall be removed from the tops of all balls, but no burlap or wrapping shall be pulled out from under that ball.

6. Bare-Root Plants: Roots of bare-root (B.R.) plants shall be properly spread out in a natural position and topsoil shall be worked in amount them by watering. All broken and frayed roots shall be cleanly cut off.

7. Container-Grown Plants: Container-grown plants shall have been grown in pots, tubs or boxes for a minimum of six (6) months and a maximum of two (2) years. Plants shall have sufficient roots to hold the earth together, intact after removal from containers, without being rootbound. The sizes for containers shall conform to the largest size container specified in the "*American Standard for Nursery Stock*" by the *American Association of Nurserymen, Inc.*

H. Fertilizer and Superphosphate:

1. Fertilizer as described under Part 2 shall be placed just prior to mulching each plant.

2. The placing of superphosphate after tree or shrub planting will not be permitted. All planting will cease until superphosphate becomes available for use.

I. Water and Mulch:

1. A shallow saucer the entire size of the pit, capable of holding water, shall be formed about each plant as shown on the plans.

2. All shrub beds shall be completely covered with wood chip mulch.

3. At the time of planting, the soil around each plant shall be saturated with 25 gallons of water for each square yard of pit area. All trees and shrubs will be watered at least once per week, unless otherwise directed by the Architect until Final Acceptance.

J. Edging of Planting Areas: All edging materials shall conform to the requirements of Item 2.07 above. Edging shall be provided at all planting beds, unless indicated otherwise on the Contract Drawings. The Contractor shall establish a neat edge where planting areas meet grass areas as shown on the plan. Edging shall be done by competent mechanics in workmanlike manner with spade or edging tool immediately after all planting and seeding is completed. Particular care shall be exercised in edging to establish flowing maintainable curves. Edging shall be maintained by the Contractor for the duration of the contract.

K. Spraying With Anti-Desiccant: Immediately after planting and staking all plant material, the Contractor shall spray all plant material with an approved anti-desiccant, using an approved power sprayer to apply an adequate film over trunks, branches, twigs and/or foliage. The anti-desiccant shall be an emulsion which will provide a protective film over plant surfaces, permeable enough to permit transpiration. Anti-desiccants shall be used in strict accordance with manufacturer's instructions and shall be delivered to the site in manufacturer's sealed containers. The anti-desiccant shall be "*Wilt-Proof*" supplied by *Nursery Specialists Products, Inc*., Croton Falls, New York; "*Vanex*" supplied by *Vansul and Company*, 193 William Street, Englewood, New Jersey. Anti-desiccants shall be delivered in the containers of the manufacturer and shall be mixed according to the directions.

3.03 GENERAL

A. Access to All Operations for Inspection: The Contractor shall furnish such facilities and give such assistance for reasonable inspections as the Architect may request and shall secure free access to all sites where the plant material is located or work is in progress.

B. Restoration: All pavements, seeded or sodded and planted areas, structures and substructures not specifically provided for in the Contract, disturbed by the Contractor during the execution of the work, shall be restored by the Contractor, in a manner satisfactory to the Architect to their original conditions at no additional cost to the Owner.

3.04 GUARANTEE AND MAINTENANCE

A. As a part of the Contract, the Contractor shall guarantee the life of all plants in this contract for a period of one year after final acceptance of planting as specified in the following:

B. Any plant which is damaged destroyed or dies from whatever cause except theft or vandalism during the above period shall be replaced within fifteen days upon written notice to the Contractor by the Architect.

C. It should be noted that due to planting seasons, the Contractor will be required to replace any dead plant within the two planting season, during the one year guarantee period which may entail replacing the same plant twice after final acceptance.

D. Upon Substantial Completion, the Owner will assume responsibility for maintenance of planted areas. The Contractor shall, however, make monthly visits to the site during the guarantee period to advise the Owner of proper maintenance procedures. No additional payment shall be made for visits. Price bid for work of this trade shall include costs of visits.

E. Failure of the Contractor to notify the Architect, in writing, of inadequate maintenance by the Owner of the planted areas installed under this Contract shall constitute acceptance of the Owner's maintenance operations by the Contractor. The Contractor shall not, therefore, use the Owner's alleged lack of proper maintenance as a basis for voiding his responsibilities under the guarantee herein specified.

F. At the end of the one-year guarantee, the Contractor shall remove and dispose of all stakes, burlap and twine from all trees as approved by the Architect. Also, all holes left due to removal of stakes shall be filled with topsoil to the existing grade.

G. The cost of maintenance, replanting operations and removal of staking and wrapping shall be included in the Contractor's bid price.

3.05 FINAL INSPECTION OF LANDSCAPING WORK

A. When, in the opinion of the Contractor, the work is complete and ready for final inspection, he shall notify the Architect who will arrange to give the entire work a thorough inspection. Before final payment will be made, any dead plants, defects or omissions noted on this inspection must be rectified by the Contractor without additional compensation.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 329301 – PLANT MAINTENANCE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Maintain plants in manner that promotes health, growth, color and appearance, to quality levels specified; replace dead, dying, and damaged plants at no extra cost to the Owner.

   1. Perform soil analysis to determine type and quantity of soil amendments; test enough soil samples to obtain a comprehensive analysis; submit reports.

B. Maintain newly planted landscape plants, including turf (lawns), trees, and shrubs.

C. Clean up landscaped areas.

D. Start Date: Project Date of Substantial Completion.

E. Maintenance Period: The time frame covered by these requirements is 90 days from substantial completion.

1.02 RELATED SECTIONS

A. Section 328000 – Irrigation System
B. Section 329000 – Turf and Grasses
C. Section 329300 – Plants

1.03 QUALITY ASSURANCE

A. Qualifications: Company specializing in maintaining plant materials, with at least three years documented experience.

1.04 SUBMITTALS FOR REVIEW

A. Submittals shall be in accordance with Section 013300.

B. Submit complete maintenance plan, showing:

   1. Irrigation volume and frequency.

   2. Fertilizer type, quantity, and schedule of application.

   3. Soil amendment type, quantity, and schedule of application.

   4. Personnel assigned, including supervisor.

   5. Inspection procedures, diagnostics, and remedies.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 INSTALLATION

A. If soil analysis has not already been performed, take sufficient samples to obtain a comprehensive analysis; perform analysis in accordance with ASTM D 4972. Saturate soil with water to test drainage.

3.02 LANDSCAPE MAINTENANCE – GENERAL

A. Protect existing vegetation, pavements, and facilities from damage due to maintenance activities; restore damaged items to original condition or replace, at no extra cost to the Owner.

B. General Cleanup: Remove debris from all landscape areas at least once a week and from turf areas before each mowing.

1. Debris consists of trash, rubbish, dropped leaves, downed branches and limbs of all sizes, dead vegetation, rocks, and other material not belonging in landscaped areas.

2. Remove debris from site and dispose of properly.

C. Watering, Soil Erosion, and Sedimentation Control: Comply with federal, state, local, and other regulations in force; prevent over-watering, run-off, erosion, puddling, and ponding.

1. Repair temporary erosion control mechanisms provided by others.

2. Repair eroded areas and replant, when caused by inadequate maintenance.

3. Prevent sediment from entering storm drains.

D. Trees: Exercise care to avoid girdling trees; provide protective collars if necessary; remove protective collars at end of maintenance period.

E. Fertilizing: Apply fertilizer only when necessary.

F. Drainage Channels: Remove obstructions in gutters, catch basins, storm drain inlets, yard drains, swales, ditches, and overflows.

1. Remove grates from catch basins to clean.

2. Prevent encroachment of other vegetation on turfed surface drainage channels.

G. Health Maintenance: Inspect all plants regularly for health:

1. Eradicate diseases and damaging pests, regardless of severity or speed of effect.

2. Treat accidental injuries and abrasions.

3. If a plant is unhealthy but not yet dead, according to specified definitions, determine reason(s) and take remedial action immediately.

4. Remove dead plants immediately upon determining that they are dead.

H. Pesticide and Herbicide Application: Not Permitted on School property.

I. Replanting: Perform replacement and replanting immediately upon removal of dead plant.

3.03 IRRIGATION

A. Irrigation: Do not allow plants to wilt; apply water as required to supplement rainfall; do not waste water; do not water plants or areas not needing water; do not water during rainfall; shut off water flow when finished; repair leaks.

B. Provide backflow preventers on hose bibbs used for irrigation hoses.

3.04 TURF MAINTENANCE

A. Maintain turf in manner required to produce turf that is healthy, uniform in color and leaf texture, and free from weeds and other undesirable growth.

1. Grass Density - Lawns: 20 plants per square foot, minimum.

2. Bare Spots - Lawns: 2 percent of total area, maximum; 6 inches square, maximum.

3. Keep turf relatively free of thatch, woody plant roots, diseases, nematodes, soil-borne insects, stones larger than 1 inch in diameter, and other materials detrimental to grass growth.

4. Limit broadleaf weeds and patches of foreign grass to a maximum of 2 percent of the total area.

B. Mowing: During growing season(s) mow turf to uniform height, in manner that prevents scalping, rutting, bruising, and uneven or rough cutting.

1. Prior to mowing clean all debris and leaves from turf surface.

2. Schedule frequency of mowing so that no more than one-quarter to one-third of grass leaf length is removed during a cutting.

3. Make each successive mowing at approximately 45 degrees to the previous mowing, if practical.

4. Cool Season Grasses:

a. Reduce mowing height in fall and spring.
b. Use rotary type mowers; mulcher type mowers may be used.

5. Warm Season Grasses:

a. Increase mowing height slightly as fall approaches.
b. Use reel type mowers; do not use mulcher mowers.

C. Summer Mowing Height for Lawns: 3 inches in height.

D. Trimming: Immediately after each mowing, neatly trim perimeter of each turf area and around obstructions within turf area; match height and appearance of adjacent turf.

1. Adjacent to Pavements: Cut edges of turf to form a distinct, uniform turf edge.

2. Adjacent to Planting Beds and Permanently Mulched Areas: Cut edges of turf to form a distinct, uniform turf edge.

3. Around Other Trees and Poles: Where no planting bed or mulched area exists, trimming with string trimmer is acceptable.

4. At Fences: Trim on both sides of fence.

5. Irrigation Heads and Valve Boxes: Trim neatly so grass doesn't interfere with operation.

E. Fertilizer: Apply as recommended by manufacturer and at rate indicated by soil analysis.

1. Cool Season Grasses: Apply at least once, in Fall before first frost; do not apply high nitrogen fertilizer during Summer; Spring application is optional but must be reduced in quantity.

F. Ground Covers:

1. Trim to encourage dense, well-developed growth covering intended areas.

2. Do not allow plants to grow up trees, shrubs, or vines or encroach into turf or drainage channels, unless the drainage channel is intended to be planted with ground cover.

3. Remove existing plants grown up trees, shrubs, and vines.

G. Flowering Plants: Remove dead flower heads; do not trim off leaves of flowering bulbs until they are brown.

3.05 TREE AND SHRUB MAINTENANCE

A. Trees will be considered dead when main leader has died back or when 25 percent or more of crown has died; except as otherwise indicated for palm trees.

B. Shrubs will be considered dead when 25 percent or more of plant has died.

C. Inspect woody plants for health by scraping up to 1/16 inch square area of bark; no green cambium layer below bark shall be evidence of death.

D. Adjust stakes, guys and turnbuckles, ties, and trunk wrap as required to promote growth and avoid girdling.

E. Pruning: Unless otherwise indicated, prune only to maintain balanced natural shape; follow recommendations of ANSI A300 and ANSI Z133.1 and best local practices for species involved.

F. Shrubs: Prune at least once during maintenance period at best time to influence ultimate shape and size for the particular species.

1. Prune to balance the plant's form and according to its natural growth characteristics.

2. Remove water shoots, suckers, and branches not conforming to desired shape and size.

G. Young Trees: Prune at least once during maintenance period at best time to influence ultimate shape and size for the particular species; do not remove or cut off leader.

3.06 CLEANING

A. Remove fallen deciduous leaves in Fall; removal may wait until all leaves have fallen.

B. Clean adjacent pavements of plant debris and other debris generated by maintenance activities.

C. Remove and dispose of general cleanup debris and biodegradable debris in a proper manner.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 331000 – WATER UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish labor, materials, potable (domestic), services, equipment, and other necessary items required for accomplishing the construction of the water systems. This shall include, but not be limited to, the following:

1. Installation of all domestic water service mains, associated service lines, main taping, meter and RPZ installations, fire hydrant installations, related sitework, etc. necessary to legally and properly feed the building from the street main water line.

2. Related items necessary to perform work, including all required coordination and interface between installing contractor and local Water Authority, including but not limited to: permitting procedures, scheduling of required Water Authority tests, inspections and closeout.

B. All domestic water service Approvals to Construct shall be obtained and provided by the Architect/Engineer. Contractor shall perform all work necessary to install the proposed domestic water and related components in accordance with the proposed design as shown on the drawings. The contractor shall only utilize components and materials currently approved by the local Water Authority or other agency having jurisdiction over the required installations. All items to be installed in strict accordance with the methods approved by the Water Authority.

C. Set lines, elevations, and grades for the duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

D. If this is a LEED Certified project, the work must comply with the requirements of the following related specifications sections:

1. **Division 01 Section 013563 "LEED Requirements" for recycled content and regional materials requirements, submittals, and additional LEED requirements.**

2. **Division 01 Section 017419 "Construction Waste Management" for recycling construction waste.**

E. Should actual field conditions differ from those shown on the Contract Documents, the Architect shall be immediately notified and no further operations will commence until further notice.

F. ***For domestic water supply systems, no changes are authorized without the Architect's and jurisdictional Water Authority's written approval.***

G. The Contractor shall be familiar with local Water Authority rules and regulations and shall be responsible to arrange and coordinate any required inspections, create and submit as-builts drawings and any other documents necessary to obtain final approvals of constructed work.

1.02 RELATED REQUIREMENTS

A. Construction drawings.

B. Specification Sections:

1. Section 310000 – Earthwork
2. Section 312500 – Erosion and Sediment Controls
3. Section 321216 – Asphalt Paving
4. Section 329000 – Turf and Grasses
5. Section 332400 – Storm Water Drainage, Structures and Castings
6. Section 333000 – Sanitary Systems
7. Section 334000.12 – Abandonment of Existing Sanitary and Stormwater Systems

C. Local governing authority and code requirements.

D. All necessary construction permits.

1.03 REFERENCE STANDARDS

A. All applicable ASTM Specifications, NYSDOT and ASSHTO standards.

1.04 SUBMITTALS

A. Submit manufacturer's product data and written specifications for all components: precast structures, cast iron frames and covers, pipe, valves, fittings, etc. in accordance with Section 013300.

B. Submit shop drawings to the Architect for approval of the following items:
1. Precast concrete structures.
2. Cast iron frames and covers.
3. Water piping, valves and fittings.

C. Submittals shall include ASTM designations, AWWA certifications, and UL labels as required.

D. Obtain approval from the Architect before materials are ordered from the manufacturer.

E. **LEED Submittals: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.05 FILING & APPLICATION FOR WATER SYSTEMS

A. It is the full intention of this project for the jurisdictional Water Authority to be completely involved during the installation of the potable water supply systems designed. The Installing Contractor shall initiate contact with the Water Authority for inspection of the designed system. The Contractor shall be completely responsible for the coordination and installation of the designed system, as well as proper contact and coordination with the jurisdictional Water Authority. All house service lines must be installed according to the Water Authority's Rules & Regulations. Each installation must be inspected by a Water Authority representative before being backfilled. Only licensed plumbers can install house service lines. Backflow prevention is required for all commercial domestic water services, as well as all firelines.

B. Installations of new, and modifications to existing systems shall not occur without proper notification and scheduling with the Water Authority for required inspections.

C. Installed components shall not be backfilled until so authorized after proper inspection by the Water Authority. The Contractor shall be present at all inspections and backfilling procedures.

D. As a condition of the contract, the Contractor will be required to obtain Permit to Operate from the jurisdictional Water Authority prior to contract closeout. The Architect will require 1 original and 3 copies of Permit to Operate prior to issuing Substantial Completion of the project.

E. It is the Contractor's responsibility to contact the Water Authority to arrange inspections of the water supply facilities prior to backfilling. This includes inspections of the water supply system components and piping, and final grading as shown on the approved plans, as well as pre-filing of all necessary Water Authority forms relative to job site preparation and required easements. All application fees required during construction (including, but not limited to: tapping fees, inspection and re-inspection fees, etc) are to be paid by the Contractor and are to be considered contractual, and not subject to additional costs to the Owner. In certain cases, special inspections of the soil excavations, as directed by the Water Authority, may be required. The Water Authority must be notified at least 48 hours in advance of scheduled backfilling. No trenches shall be backfilled without the written approval of the Water Authority. Proof of acceptance must be submitted to the Architect for file and distribution purposes.

F. The Water Authority's project reference number and property tax map number must be clearly noted on all correspondence or documents that the Water Authority requires to be submitted by the Contractor.

G. Contractor shall supply four (4) prints of an as-built plan of the subject project. As-built information shall be submitted to the Architect's office, including triangulation plotting and inverts of all existing piping and structures. As-built information shall also include all related manhole covers, berms and "hot box"/RPZ vault locations and access points.

H. The Contractor shall note well that abandoned systems or systems scheduled for removal will require complete testing of adjacent soils and existing tank contents in full conformance with the Water Authority's standards for contamination testing & abatement. Written proof of compliance with these requirements shall be submitted to the Architect's office prior to request for Substantial Completion review.

I. The Contractor shall submit to the Architect's office a certification letter (on official company letterhead) which details an inventory of the components of the system installed, as well as the date of the Water Authority inspections.

J. The local Water Authority must inspect all water systems from the point of connection at the municipal system up to and including new RPZ configurations installed under this contact. The local Department of Health shall inspect and approve all other on-site potable water supply piping installations.

K. If public water is utilized to serve this project, a tap letter from the appropriate Water Authority indicating that service has been completed to the building(s) will be required as a part of this contract. Note: Typically, tap letters can only be requested after all fees have been paid, water service is established and the water meter has been set. The Contractor shall coordinate this procedure with the Water Authority.

L. The Contractor shall coordinate the testing of all installed backflow prevention devices with and through the Water Authority. The Contractor shall obtain from the Water Authority a list of Certified Backflow Prevention Device Testers. The device tester's fees shall be paid for by the Contractor, and are considered as a contractual item, not subject to additional charges to the Owner.

M. After all service lines have been inspected, the Contractor shall file for the setting of the water meter.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in ample time to facilitate the work as under this Section.

B. Store and handle all materials in accordance with the manufacturer's recommendations.

1.07 QUALITY ASSURANCE

A. Environmental Agency Compliance: Comply with regulations pertaining to potable water and sanitary sewage systems.

B. Unless otherwise instructed, all work is to be observed by the Architect/Engineer, and tests and observation work are to meet his approval at each stage prior to backfilling. ***When public authorities require observation and approval by, or supervision of, the Work is required, comply with their requirements. Re-excavate any Work covered before observation and approval by local jurisdictional agencies at no additional cost to the Owner.***

C. Install pipe and fittings in strict accordance with best acceptable practice to insure proper functioning, freedom from trouble, and neatness of appearance.

D. Verify all connection requirements with the utility owner(s).

PART 2 - MATERIALS

2.01 CONSTRUCTION MATERIALS REQUIREMENTS

A. General – All components used in the sewage disposal system shall comply with the N.Y.S.P.C and with the appropriate National Sanitation Foundation (NSF), the American Society of Testing Materials (ASTM), the American Association of Highway and Traffic Office, and/or the American Water Works Association (AWWA) requirements. Concrete shall conform to ASTM C-33 and ASTM C-150 standards. Concrete reinforcement shall conform to ASTM A-185 and ASTM A-615 as applicable. All materials shall be identified as to manufacturer and have identification visible at the time of inspection.

2.02 WATER SUPPLY SYSTEM

A. In all cases, use only new materials. Furnish factory-fabricated fittings of the highest quality and of the same type and class of material as the pipe.

B. Pipe and pipe fittings, including valves and faucets, utilized in the water supply system shall have a maximum of 8-percent lead content.

C. Water Main Piping:

1. Water main piping up to 6-inch inside nominal diameter shall be ductile iron, cement-lined pipe Class 52, “Tyton” type joint, centrifugal cast pressure pipe for water. The pipe shall be ductile iron centrifugally cast in metal molds and sand-lined molds, conforming to the latest edition of ANSI/AWWA C151/A21.51. The interior of the pipe shall be cement mortar-lined, in accordance with the latest edition of ANSI/AWWA C104/A21.4 double-thickness, and then seal coated on the exposed surface of the lining with a bituminous coating. All pipe used must be listed as ANSI/NSF 61, approved in regards to coatings and cement linings. The “Tyton” or “Super Bell-Tite” type joint, ductile-iron pipe may be furnished in either 18 or 20 foot laying lengths.

2. Water main piping 8 inch to 16 inch inside nominal diameter shall be ductile iron, cement-lined pipe Class 53,“Tyton” type joint, centrifugally cast pressure pipe for water. Ductile iron pipe barrels shall conform to the requirements of ANSI/AWWA C151/A21.51. The pipe shall be ductile iron pipe centrifugally cast in metal molds and sand-lined molds, conforming to the latest edition of ANSI/AWWA C151/A21.51. The interior of the pipe shall be cement mortar lined in accordance with the latest edition of ANSI/AWWA C104/A21.4 double thickness and then seal-coated on the exposed surface of the lining with a bituminous coating. All pipe used must be listed as ANSI/NSF 61 approved, in regard to coatings and cement linings. Threads on the pipe

barrel shall be tapered pipe threads (NPT) in accordance with ANSI B1.20.1 adapted to the ductile iron pipe outside diameter.

a. All fittings for flanged joint pipe shall be ductile iron, manufactured to ANSI/AWWA C110/A21.10 for standard straight size fittings. Flanges shall be drilled in place in accordance with ANSI B16.1 Class 125 flanges. Flanged fittings shall be cement-lined.

3. Water main piping flanges shall be ductile iron, and conform to the chemical and physical properties specified for ductile iron fittings in accordance with ANSI/AWWA C110/A21.10.

4. All flanges shall meet the latest edition of American Water Works Association Standard Specifications for ductile iron compact-fittings, mechanical joint, rated at 350 psi, AWWA C153/A21.53. All fittings shall be tar-coated outside and cement-lined inside, in accordance with the latest edition of AWWA C104. All fittings must be listed as ANSI/NSF 61 approved in regard to coatings and cement linings.

5. The Architect reserves the right to have any material furnished tested by an independent testing laboratory for specifications compliance at the Contractor's expense.

6. When installing pipe, all pipe shall be laid at the bottom of the trench so that the full length of pipe is supported by natural soil, and bell holes are to be of sufficient size to insure proper joint making, but not so large as to cause undue stress on the pipe.

a. All pipes shall be laid in a minimum trench depth of 4 feet and 9 inches; top of pipe 54" below finished grade.
b. Adequate 'Thrust' blocking must be provided for all ductile iron fittings, in order to prevent movement of same. The method of blocking shall be approved by the Architect/Engineer.
c. Reference section 3.01 for additional information.

7. On installations of pipeline in the Contract, the Architect requires the Contractor to deposit 1/2 ounce of chlorine in each length of pipe as it is laid, for the purpose of disinfecting the main. The main shall then be filled with water for at least one hour and then flushed out. The chlorine solution will be furnished by the Contractor. This chlorination shall be done under the direction of the Architect/Engineer.

8. The Contractor shall be required to furnish all bolts, nuts, washers and gaskets necessary to install and join the flanged fittings together.

a. The method of installing and jointing "Tyton" and "Bell-Tite" type and mechanical joint cast iron pipe and fittings shall conform to general instructions, as outlined by the manufacturer. All mechanical joints bends, tees, wyes and gate valves must be installed with retainer glands, unless mating with cast iron pipe, glands shall be used.

9. The Contractor shall in no case cut off the flow of water through any main without written permission by the Architect and shall notify the Owner's Representative/Construction Manager at least 72 hours in advance of the time of shutdowns.

a. No shutdown for making connections will be allowed until the Contractor has everything in readiness, and having made the shutdown, the work shall be carried on continuously and without interruption until the connection is completed, and the water is turned on again.

10. The Authority will test the mains after they are installed for leaks and for contaminants. Any leaks shall be repaired by the Contractor, at no additional cost to the Owner/Authority.

a. In the event that contaminants are present, the Contractor will be notified. If, after attempts of removing same have been exhausted by the Authority, the Contractor will be given the

opportunity to bring the piping into compliance with Authority standards at the Contractor's expense. The Contractor will be required to act immediately to mitigate the situation. The main shall be removed and replaced by the Contractor at no cost to the Owner if the contaminants are not removed 30 days from "Notification of Non-Compliance" by the Authority.

11. Retainer glands shall be ductile iron, UL-approved, as manufactured by EBAA Series 1200 or equal.

12. When shoring is required, an acceptable method conforming to OSHA Standards shall be used. The cost for any shoring shall be included in the Contractor's Base Bid submitted for this project, and shall not be subject to additional charges to the Owner.

13. The fire protection lines are to be tested to 200 psi and meet all current NFPA requirements.

14. Water main piping alternate as may be allowed by the Architect and the Authorities having Jurisdiction; shall be 'JM Eagle' "Blue-Brute" PVC pipe and fittings produced in conformance with AWWA C900, ASTM F477 and ASTM D3130. Pipe to conform to AWWA C900-07 pressure class 165psi (DR 25), ANSI/NSF Standard 61, UL 1285 and FM approved. Pipe and fittings to be installed in strict compliance with manufacturers installation instruction guidelines and the rules and regulations of the Local Authorities having Jurisdiction including those of the Water Service Provider, County Water Authority and the New York State Plumbing Code (latest edition).

    a. Adequate 'Thrust' blocking and anchorage must be provided for all PVC pipe and fittings, in order to prevent movement of same, in compliance with the manufacturer's installation instruction guidelines. As a minimum 'Trust' blocking shall be as follows:
        1) Thrust at Fittings:
            a) 90º Bends = 9,100 PSF
            b) 45º Bends = 4,920 PSF
            c) Tees and Plugs = 6,430 PSF

        2) Allowable Bearing of Soil:
            a) Sand and Gravel = 2,000 PSF

        3) Thrust Block Sizing :
            a) 90º Bends = 4.55 square foot area of concrete up against the trench wall.
            b) 45º Bends = 2.46 square foot area of concrete up against the trench wall.
            c) Tees and Plugs = 3.22 square foot area of concrete up against the trench wall.
            d) The installation contractor shall provide calculations and details of Thrust blocking and Anchorage prior to installation to the Architect/Engineer for review and acceptance.

D. Separation of Water Lines and Sanitary Lines:

1. Parallel Installation: Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main or lateral. The distance shall be measured edge to edge.

2. If it is not practical to maintain a horizontal separation of ten feet, the Local Health Department may allow a deviation on a case-by-case basis. Such deviation may allow for the installation of the sewer to be a minimum of 5 feet to a water main or a lateral, provided that the bottom of the water main or lateral is at least 18 inches above the top of the sewer line.

E. Site and Plumbing Contractors shall coordinate their operations to ensure a smooth transition between each other's work.

PART 3 - EXECUTION

3.01 INSTALLATION – POTABLE WATER SUPPLY SYSTEM & PIPING

A. Location of full-open valves: When installing potable water supply piping, full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb;
2. On the water distribution supply pipe at the entrance into the structure;
3. On the discharge side of every water meter;
4. On the base of every water riser pipe in occupancies other than multiple-family residential occupancies that are two stories or less in height and in one and two family residential occupancies.
5. On the top of every water down-feed pipe in occupancies other than one- and two-family residential occupancies.
6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops.
7. On the water supply pipe to a gravity or pressurized water tank.
8. On the water supply pipe to every water heater.

B. Access to Valves shall be provided to all full-open and shutoff valves.

C. Valve Identification: Service and hose bibb valves shall be identified in accordance with Specification 220553 (“Plumbing Identification System”) requirements. All other valves installed in locations that are not adjacent to the fixture or appliance shall be identified, indicating the fixture or appliance served.

D. Thrust Blocking: Place thrust blocking consisting of 3,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs./s.f. when water main pressure is 100 psi or greater.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Diameter	Tees s.f.	90 Degree Bend s.f.	45 Degree Bend s.f.	22 Degree Bend s.f.
4”	1.5	1.5	1.5	1.5
6”	1.5	3.0	1.5	1.5
8”	2.5	5.0	1.8	1.5
10”	4.0	7.0	2.8	1.5
12”	6.0	10.0	4.0	2.0
14”	8.0	11.0	5.5	3.0
16”	10.0	15.0	7.0	4.0

E. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline service. Provide facilities for dewatering and for disposal of water removed from dewatered lines and excavations without damage to adjacent property.

F. At the main water pipe transitions between the plumber and site contractor, use non-shear high strength elastomeric couplings when jointing non-similar materials.

1. On the water supply pipe to every water heater.

3.02 FIELD QUALITY CONTROL

A. Water Supply Systems: Test water distribution system pipe sizes installed below grade and outside building in accordance with PCNYS Section 312 requirements and the following procedures:

1. All pipe work shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe (150 psi) and maintain said pressure for not less than two hours.

2. Furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA Specification C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, meter shall be tested, sealed, and approved by applicable governing authority at the Contractor's expense.

3. Locate and repair all leaks and repeat tests until test results are satisfactory and in compliance with this section.

4. Furnish copy of results of meter test and hydrostatic pressure test to Owner upon completion of water distribution backfilling operations.

3.03 INSPECTION / BACKFILLING

A. All sequential inspections shall be conducted by the Local Water Authority, coordinated by and through the Contractor. The inspector shall review all piping and section alignment, infiltration, or other defects in the installation, and the Contractor shall correct accordingly. The Contractor shall expeditiously conduct all required revisions to the satisfaction of the Water Authority officials assigned to the project. The Contractor shall obtain all final written clearances from the Water Authority inspectors allowing the systems to be backfilled, and shall provide copies of same to the Architect for his distribution to the Owner for future use and files.

3.04 DISINFECTION OF POTABLE WATER SYSTEM

A. Per Section 610 of PCNYS, new or expanded potable water systems shall be purged of deleterious matter and disinfected prior to utilization. ***The method to be followed shall be in accordance with the applicable NYS Department of Health regulations.*** After sterilization, the Contractor shall arrange for water and bacteriological testing in accordance with AWWA specifications and applicable NYS / Local Department of Health requirements. Do not place distribution system in service until approval is obtained from all applicable governing authorities.

3.05 SITE RESTORATION AND CLEAN-UP

A. The Contractor shall clean up and legally remove from the site all rubbish and surplus material as it accumulates and shall not permit it to be scattered around the project site.

B. If this is a LEED Certified Project, disposal must comply with Division 01 Section 017419 “Construction Waste Management” for recycling construction waste.

C. The Contractor shall restore all areas of the site affected by the work to its original condition, inclusive of pavements, topsoil and grass, plantings or other ground cover.

3.06 GUARANTEE

A. Provide guarantee, stating that the work will remain free of defects in materials and workmanship for a minimum period of 10 years from the date of Substantial Completion and that upon failure of the installation to perform as warranted, the Contractor will repair or replace the defective work to

conform with the requirements of the Contract Documents, including removal and replacement of other work as required.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 331100.19 – ABANDONMENT OF WATER MAINS

PART 1 – GENERAL

1.01 SCOPE

A. Abandonment in place, by cutting and capping, of existing water mains, hydrants, service lines, and valves.

B. Optional abandonment in place of water mains using flowable fill. Flowable fill will be utilized when abandoning water mains underneath roadways and paved areas, and at the direction of the Engineer as field conditions dictate, or as specified on the Drawings.

1.02 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Submit product data for proposed plugs and clamps for approval.

C. Technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.

D. At least 15 days prior to commencing flowable fill abandonment activities, submit plan for abandonment, describing proposed grouting sequence and other information pertinent to completion of Work.

PART 2 – PRODUCTS

2.01 GENERAL MATERIALS

A. Concrete for thrust blocks: Minimum 3,000 psi concrete conforming to requirements of Section 033000 – Cast-in-Place Concrete.

B. Plugs and clamps: Applicable for type of pipe to be plugged.

2.02 FLOWABLE FILL REQUIREMENTS

A. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.

B. Placement characteristics: self -leveling.

C. Shrinkage characteristics: non-shrink.

D. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.

E. Minimum wet density: 90 pounds per cubic foot.

2.03 BALLAST

A. Ballast Material: Natural rock or concrete pieces with minimum size equal to at least 10 times maximum aggregate size of flowable fill and maximum size of 24 inches. Maximum dimension shall not be more than 20 percent of minimum dimension of space to be filled.

B. Ballast Composition: Free of regulated waste material.

PART 3 – EXECUTION

3.01 DEMOLITION OF FIRE HYDRANTS, VALVES, AND PIPELINE STRUCTURES PRIOR TO ABANDONMENT

A. Remove all watermain appurtenances, such as hydrants, valves, and valve boxes. Appurtenances shall be returned to owner for future use or discarded when directed.

B. Demolish and remove precast concrete adjustment rings, concrete vaults and covers, or other pipeline structures, to minimum depth of 4 feet below finished grade. Structure may be removed to greater depth, but not deeper than 18 inches above crown of abandoned water main. Make holes in floor prior to filling.

C. Until a fire hydrant is physically removed, any hydrant that becomes non-usable during abandonment procedures shall have a heavy duty cover placed over it and secured and marked “Abandoned” or “Not-in-Service” so that fire department personnel know its status.

3.02 CUTTING AND CAPPING OF WATER MAINS

A. Do not begin cut, plug, and abandonment operations until replacement water main has been constructed and tested, all service connections have been installed, and replacement main is approved for use.

B. Install plug, clamp, and concrete thrust blocks and make cut at the water main and/or at the location shown on Drawings.

C. Water Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on Drawings.

D. After main to be abandoned has been cut and capped, check for other sources feeding abandoned water main. When sources are found, notify Engineer immediately. Cut and cap abandoned main at point of other feed as directed.

E. Plug or cap ends or opening in abandoned main in manner approved by the Engineer. Install concrete around cap and over pipe to ensure it is not penetrable by groundwater.

F. Backfill excavations in accordance with Section 310000 – Earthwork.

G. Repair street surfaces in accordance with the drawings.

H. Mark location of abandoned water service laterals on As-Built Drawings and provide to the Engineer.

3.03 CUTTING AND CAPPING OF WATER SERVICES

A. Do not begin cut, plug, and abandonment operations until replacement service, if necessary, has been constructed and tested, and all service connections have been installed.

B. Service lines shall be cut and capped at the water main and/or as directed by the Engineer.

C. Before backfilling of a capped service line is started, the capping must be observed by a representative of the Engineer.

D. After service to be abandoned has been cut and capped, check for any other sources feeding abandoned water service. When sources are found, notify the Engineer immediately. Cut and cap abandoned main at point of other feed as directed.

E. Plug or cap ends or opening in abandoned service in manner approved by the Engineer. Install concrete around cap and over pipe to ensure it's not penetrable by groundwater.

F. Remove all water service surface identifications and appurtenances such as valves and valve boxes, meters, and backflow devices. Return appurtenances to the Owner of discarded when directed.

G. Backfill excavations in accordance with Section 310000 – Earthwork.

H. Repair paved surfaces in accordance with the drawings.

I. Mark location of abandoned water services on As-Built Drawings and provide to the Engineer.

3.04 PREPARATION FOR ABANDONMENT VIA FLOWABLE FILL

A. Have fill mix design reports and other submittals required by Paragraph 1.05 accepted by the Engineer prior to start of placement. Notify the Engineer at least 24 hours in advance of grouting with flowable fill.

B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portion of work, new or existing.

C. Clean water lines and video with closed circuit television to identify connections, locate obstructions, and assess condition of pipe. Locate previously unidentified connections, which have not been redirected and reconnected as part of the Work, and report them to the Engineer. During placement of fill, compensate for irregularities in water pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.

D. Perform demolition work prior to starting fill placement. Clean placement areas of water mains of debris that may hinder fill placement. Remove excessive amounts of tuberculations and other substances that may degrade performance of fill. Do not leave debris in place if filling more than 2 percent of placement volume.

E. Remove free water prior to starting fill placement.

3.05 EQUIPMENT FOR ABANDONMENT VIA FLOWABLE FILL

A. Mix flowable fill in automated batch plant and deliver it to site in ready -mix trucks. Performance additives may be added at placement site if required by mix design.

B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.06 INSTALLATION OF FLOWABLE FILL

A. Abandon existing water lines underneath roadways, paved areas and other required locations by completely filling water mains with flowable fill.

B. Place flowable fill to fill volume between abandonment points. Continuously place flowable fill with no intermediate pour points, but not exceeding 500 feet in length.

C. Have filling operation performed by experienced crews with equipment to monitor density of flowable fill and to control pressure.

D. Pump flowable fill through bulkheads constructed for placement of two 2 -inch PVC pipes or use other suitable construction methods to contain flowable fill in lines to be abandoned. These pipes will act as injection points or vents for placement of flowable fill.

E. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill water main from downstream end, to discharge at upstream end.

F. Inject flowable fill through replaced ballast using grouting equipment and series of grout pipes discharging at bottom of placement, allowing fill to rise through ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at same time as flowable fill is placed. Do not fill with ballast more than 50 percent of volume at any level, to prevent nesting and void formation.

G. Remediate placement of flowable fill which does not fill voids in water main or where voids develop due to excessive shrinkage or bleeding of fill, by using pressure grouting either from inside watermain or from surface.

H. Plug each end of the water main being abandoned.

I. Backfill to surface, above pipe left in place. Place and compact backfill in compliance with Section 310000 – Earthwork.

J. Collect and dispose of excess flowable fill material and other debris in accordance with waste material disposal or as directed by the Engineer.

3.07 PROTECTION OF PERSONS AND PROPERTY

A. Provide safe working conditions as required by OSHA and applicable State and local laws for employees throughout demolition and removal operations. Observe safety requirements for work below grade.

B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to work.

3.08 ASBESTOS CONCRETE PIPE

A. Any work involving or impacting asbestos concrete pipe must be in accordance with the EPA’s document titled “Demolition Practices Under the Asbestos NESHAP”.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 332116 – IRRIGATION WELL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The General Provisions of the Contract, including the General and Supplementary Conditions and Division 01 - General Requirements shall govern all work under this section.

B. Provide all labor, materials, equipment, and services, and perform all operations required to install an irrigation well pump, well pit, and pump house as shown on the drawings and as specified herein.

C. Field inspect the site prior to submittal of the bid to determine all existing conditions affecting the work. Any existing condition which may preclude the proper execution of the specified work shall be brought to the attention of the Architect prior to submittal of the bid.

D. Obtain and pay for all permits and/or required testing for the installation of the work.

E. Provide and install all gravel, piping, splicing, wiring, starters, disconnects, filters, screening, and make all proper connections for a complete installation.

F. Perform all required excavation and backfill and install all piping at a depth to provide sufficient cover to avoid damage by frost and/or traffic.

G. Grade and seed all disturbed areas to the satisfaction of the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Well pump shall be a 5 HP, 4" submersible (70 g.p.m., 60 psi) pump as manufactured by "Sta-Rite" or approved equal by the Architect.

B. Pump shall have the following characteristics:

1. Discharge: Cast iron.

2. Pump bowls: Cast iron.

3. Impellers: Lexan with brass insert.

4. Collets: Stainless steel.

5. Upthrust bearing: Bronze.

6. Pump/motor coupling: Stainless steel.

7. Pump shaft: Stainless steel.

8. Bowl and intake bearing: Nitrile.

9. Lead guard: Stainless steel.

10. Securing/locking hardware: Stainless steel.

11. Intake bracket: Cast iron.

12. Screen: Stainless steel.

C. Pump motor shall be a 5 HP, 3.7 KW, single phase, 4" high trust submersible as manufactured by Franklin Electric or approved equal by the Architect.

D. Motor shall have the following characteristics:

1. Castings: Gray iron, nickel plated.

2. Stator shell: 301 s.s.

3. Stator ends: Low carbon steel.

4. Shaft extension: 17-4 s.s.

5. Fasteners: 300 Series s.s.

6. Seal cover: Bronze.

7. Seal: Nitrile rubber lipseal.

8. Diaphragm: Nitrile rubber.

9. Diaphragm plate: 304 s.s.

10. Diaphragm spring: 302 s.s.

11. Diaphragm cover: 304 s.s.

12. Slinger: Nitrile rubber.

13. Lead wire (or cable): XLPE.

14. Lead potting: Epoxy.

15. Lead jam nut: 303 s.s.

16. Filter: Delrin and polyester.

E. Control box(es) shall be as manufactured by Franklin Electric or approved equal by the Architect.

F. Control box(es) shall have the following characteristics:

1. Single phase submersible type suitable for outdoor mounting with operation over temperature ranges of +14°F to +122°F.

2. Start and run winding overloads to protect the motor from failure due to abnormal conditions.

3. Magnetic line contactor.

4. A heavy-duty terminal strip with box type lugs.

5. Ground screws for grounding the control box to the power supply ground.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Contractor shall install irrigation pump and all related components and perform all required excavation to produce the specified horsepower (HP), gallons per minute (gpm) capacity, and pumping depth.

3.02 TESTING

A. Contractor shall perform pressure and blow tests to assure that the well will yield a minimum of 70 gallons per minute at 70 pounds per square inch.

3.03 GUARANTEE

A. Contractor shall guarantee that the well will yield 70 gpm at 70 psi for a period of one (1) year from final acceptance.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 333000 – SANITARY SEWERAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish labor, materials, services, equipment, and other necessary items required for accomplishing the construction of the on-site sanitary drainage systems. This shall include, but not be limited to, the following:

1. On-site sanitary disposal systems, including all I/A Systems, septic tanks, grease traps, leaching pools, castings, covers, system piping and other sanitary components where indicated on the drawings.

2. Related items necessary to perform work, including all required coordination and interface between installing contractor and local Health Department, including but not limited to: permitting procedures, scheduling of required Health Department tests, inspections and closeout.

B. All sanitary Approvals to Construct shall be obtained and provided by the Architect/Engineer. Contractor shall perform all work necessary to install the proposed sanitary systems and related components in accordance with the proposed design as shown on the drawings. The contractor shall only utilize components and materials currently approved by the local Health Department or other agency having jurisdiction over the required installations. All items to be installed in strict accordance with the methods approved by the local Health Department.

C. Set lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

D. If this is a LEED Certified project, the work must comply with the requirements of the following related specifications sections:

1. **Division 01 Section 013563 "LEED Requirements" for recycled content and regional materials requirements, submittals, and additional LEED requirements.**

2. **Division 01 Section 017419 "Construction Waste Management" for recycling construction waste.**

E. Should actual field conditions differ from those shown on the Contract Documents, the Architect shall be immediately notified and no further operations will commence until further notice.

F. No changes are authorized without the Architect's and jurisdictional Health Department's written approval.

G. The Contractor shall be familiar with local Health Department rules and regulations and shall be responsible to arrange and coordinate any required inspections, create and submit as-builts drawings and any other documents necessary to obtain final approvals of constructed work.

1.02 RELATED REQUIREMENTS

A. Construction drawings.

B. Specification Sections:

1. Section 310000 – Earthwork
2. Section 321216 – Asphalt Paving
3. Section 329000 – Turf and Grasses
4. Section 331000 – Water Systems
5. Section 332400 – Storm Water Drainage, Structures and Castings
6. Section 334000.12 – Abandonment of Existing Sanitary and Stormwater Systems

C. Local Department of Health Services regulations.

D. Local governing authority and code requirements.

E. All necessary construction permits.

1.03 REFERENCE STANDARDS

A. All applicable ASTM Specifications, NYSDOT and ASSHTO standards.

B. Nassau County Department of Health Standards, if applicable.

C. Nassau County Department of Public Works, if applicable

1.04 SUBMITTALS

A. Submit manufacturer's product data and written specifications for all components: precast structures, cast iron frames and covers, pipe, valves, fittings, filter fabric, etc. in accordance with Section 013300.

1. Submit shop drawings to the Architect for approval of the following items:
2. Precast concrete sanitary system structures, grease traps, septic systems and leaching pools.
3. Perforated and non-perforated corrugated polyethylene pipe and fittings (for stormwater drainage systems).
4. Cast iron frames and covers.
5. Sanitary drainage piping.
6. Filter fabric.

B. Submittals shall include ASTM designations, AWWA certifications, and UL labels as required.

C. Obtain approval from the Architect before materials are ordered from the manufacturer.

D. **LEED Submittals: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in ample time to facilitate the work as under this Section.

B. Store and handle all materials in accordance with the manufacturer's recommendations.

1.06 QUALITY ASSURANCE

A. Environmental Agency Compliance: Comply with regulations pertaining to potable water and sanitary sewage systems.

B. Unless otherwise instructed, all work is to be observed by the Architect/Engineer, and tests and observation work are to meet his approval at each stage prior to backfilling. ***When public authorities require observation and approval by, or supervision of, the Work is required, comply with their requirements. Re-excavate any Work covered before observation and approval by local jurisdictional agencies at no additional cost to the Owner.***

C. Install pipe and fittings in strict accordance with best acceptable practice to insure proper functioning, freedom from trouble, and neatness of appearance.

D. Provide proper fittings for the installation of, and connection to sewer lines. Where an underground branch connection is required, provide a "Y" branch and 30-degree curve-type fitting. Connections made by cutting holes in pipe will not be permitted.

E. Prior to final observation, flush sewers with water in sufficient volume to obtain free flow through each line. Remove all obstructions and correct defects discovered.

F. Verify all connection requirements with the utility owner(s).

PART 2 - MATERIALS

2.01 CONSTRUCTION MATERIALS REQUIREMENTS

A. General – All components used in the sewage disposal system shall comply with the N.Y.S.P.C and with the appropriate National Sanitation Foundation (NSF), the American Society of Testing Materials (ASTM), the American Association of Highway and Traffic Office, and/or the American Water Works Association (AWWA) requirements. Concrete used in the construction of sewage disposal system components shall conform to ASTM C-33 and ASTM C-150 standards. Concrete reinforcement shall conform to ASTM A-185 and ASTM A-615 as applicable. All materials shall be identified as to manufacturer and have identification visible at the time of inspection.

2.02 SANITARY DISPOSAL SYSTEM

A. All septic tank components (i.e. – slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

B. Grease Traps: All restaurants and/or food preparation establishments are required to install a grease trap for the kitchen or food preparation area. A grease trap is considered part of the equipment necessary to obtain a Permit to Operate a Food Establishment pursuant to the Local County Sanitary Code. Grease traps must be cleaned and maintained on a regular basis in order to insure proper functioning ad insect-free performance. Grease traps shall be located below grade and outside the building preceding the septic tank or sewer line. Only discharges from the kitchen or food preparation areas may be piped to grease traps. Grease traps shall be located in areas that are easily accessible for routine inspection and maintenance. Internal grease traps are permitted when allowed by the Health Department.

1. All external grease trap components (i.e. – slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

2. All internal grease traps shall be placed on kitchen waste branch pipes prior to connecting to the main sanitary sewer line.

C. Leaching Pools: Leaching pools must be installed in areas that are easily accessible for routine inspection, maintenance, replacement or expansion. Refer to Local Health Department guidelines

for additional requirements concerning the location of leaching pools.

1. The maximum permissible depth of a precast concrete leaching pool is twenty-five feet from finished grade. The minimum permissible effective depth of any leaching pool shall be three feet.

2. The minimum vertical separation distance from the bottom of the leaching pools to the highest recorded groundwater elevation shall be 3 feet for all new leaching pools installed.

3. All leaching pools (i.e.–slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

D. Manholes: Manholes are used as a part of a sewage disposal and collection systems to distribute equal volumes of sewage, to allow for access, or to collect and re-distribute sewage.

1. All manholes (i.e.–slabs, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

E. Gravity Sewer Lines: Gravity sewer lines and fittings shall meet or exceed ASTM Standard D-3034 for PVC sewer pipe with a minimum SDR 35 rating, unless otherwise indicated.

1. PVC pipe and fittings shall be provided with integral bells and spigots and rubber sealing tings. The sealing rings shall meet the requirements of ASTM Standard F-4&7. All sewer lines shall be straight, and couplings shall be securely installed and be watertight.

2. All sewer lines shall have a minimum diameter of four (4) inches.

F. House Connections: A house connection is defined as the portion of the gravity sewer line which extends from the face of the building to the sewage disposal or sewer system.

1. There shall be a minimum two (2) foot length of cast iron sewer line extending through the foundation.

2. House connections shall have a minimum diameter of 4 inches, unless otherwise noted; house connections serving two or more commercial or multiple residential units shall have a minimum diameter of 6 inches.

3. House connections shall have a minimum pitch of one-quarter inch per foot.

4. Slip ring connectors of the proper type shall be used at the cast iron joint. If required, a flexible PVC coupling with stainless steel bands may be used to connect cast iron pipe to PVC house connections. The flexible coupling and bands shall conform to ASTM C1173.

5. All house connections shall be provided with a clean-out at the face of the building.

G. Castings and covers shall be extra heavy cast iron and steel of the type specified on the contract drawings, conforming to the requirements of the municipality having jurisdiction.

H. Polyvinyl Chloride Sanitary Sewer Pipe (unless otherwise noted on approved construction plans):

1. Pipe and fittings shall comply with ASTM D 3034-78 or D949-86, and shall have a pipe diameter to wall thickness ratio (SDR) of 35 minimum. Pipe shall be ASTM Type PSM, continually marked with manufacturer's name, pipe size, cell classifications, SDR rating, and ASTM D3034 classification.

2. Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied

elastomeric gaskets and lubricant.

3. Furnish factory-fabricated pipe fittings of the highest quality and of he same type and class of material as the pipe.

4. At the main sanitary pipe transition between the plumber and site contractor, use non-shear high strength PVC elastomeric couplings when jointing non-similar materials.

I. Ductile Iron Sanitary Sewer Pipe (DIP) and Fittings:

1. Ductile iron pipe shall be centrifugally cast, conforming to the requirements of ANSI, A21.51 (AWWA C151).

2. Pipe and fittings shall be Pressure Class 150 psi and shall have a minimum wall thickness of Class 53 pipe.

3. Fittings shall be cast iron or ductile iron conforming to the requirements of ANSI A21.10 (AWWA C110).

4. All pipe joints shall be either mechanical joints or push-on joints. Joints for valves and fittings may be flanged. Mechanical joints, push-on joints and gaskets shall conform to the requirements of ANSI A21.11 (AWWA C111).

5. All gaskets for mechanical joints shall be lead-tipped gaskets.

6. Flanged joints shall conform to the requirements of ANSI A21.15 (AWWA C115) and ANSI B16.1.

7. Lining: All pipe and fittings shall be cement lined in accordance with ANSI A21.4 (AWWA C104). The lining shall be centrifugally applied and have a bituminous sealer. The cement lining shall be standard thickness.

8. All pipe and fittings shall be coated on the outside at the point of manufacture with a coal tar pitch varnish (Pipe dip). The coating shall average one-and-one-half (1½) to two (2) mil dry film thickness.

9. Pipe and fittings shall be encased in polyethylene tubes or sheets in accordance with ANSI A21.5 (AWWA C105). The polyethylene tubes shall have a minimum thickness of eight (8) mil.

J. Cleanouts, including those in vitrified clay lines, shall be iron body type with extra heavy bronze plugs.

K. Manholes:

1. Construct manholes of precast concrete sections as required by the drawings to size, shape, and depth indicated, but never less than 2'-0" inside diameter.

2. Precast Construction (septic tanks, leaching pools, grease traps, pool wrap, backfill material, grouts, castings, etc.): Construction shall comply with the requirements of the Local County Department of Health Services, and shall be of the type specified on the Contract Drawings.

3. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls and point up irregularities and rough edges with non-shrinking grout.

4. Inverts: Shape inverts for smooth flow across structure floor as shown on the drawings. Use

concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

5. Cast Iron Frames, Covers, and Grates: After completion of manhole or inlet, set frame in full mortar bed and adjust to required elevation.

L. In all instances, use only new materials.

PART 3 - EXECUTION

3.01 INSTALLATION – SANITARY SYSTEM & PIPING

A. All installations shall be in accordance with plans as approved by the Local Health Department.

B. Provide all necessary excavation, trenching, shoring, and backfilling required for the installation of all septic tanks and leaching structures and for the proper laying of all pipe. Do not backfill until installation has been inspected by the Local Health Department and approved. Install system components and pipe promptly after excavation, schedule with inspecting agency on-site to approve, to keep the excavation open for as short a time as possible.

C. Sewage disposal systems shall not be located:

1. In any area subject to imminent erosion, which cannot be controlled so as to protect the sewage disposal system(s);

2. In areas where the highest recorded groundwater level is less than one foot below the original ground surface;

3. In areas with existing slopes greater than 15%, unless the site can be properly graded in accordance with the standards of the Local Health Department.

4. In areas where the existing subsoils contain meadow mat, bog, silts, clays or other impervious material extending below the groundwater table;

5. In areas where the groundwater conditions are not conducive to the proper functioning of subsurface sewage disposal systems;

6. Where topography concentrates runoff onto or into the area where the system is proposed;

7. In any area or under any part of a building, or other improvements that does or may prevent reasonable access for repair or maintenance of the system;

8. In any area which may reasonably be expected to create a public health risk.

D. Site Condition Requirements: Sewage disposal systems shall be located:

1. On land owned in fee by the applicant (except for Community or Municipal Sewage Treatment Systems);

2. On the same parcel as the building(s) to be serviced (except for Community or Municipal Sewage Treatment Systems);

3. In an area which is easily accessible for purposes of maintenance and/or replacement of sewage disposal and treatment system components;

4. In accordance with the minimum separation distances and other conditions dictated by the Local Health Department.

E. Other Site Specific Considerations: To protect the public water supply and the benefits that freshwater wetlands, tidal wetlands, streams, and other surface waters provide, all projects may be subject to a separate site review by the Local Health Department. The following criteria may apply to these sites:

1. Sewage disposal systems shall be located to maximize distances to public water supply wells. If the Local Health Department determines that insufficient distance exists to protect the well, further treatment may be required.

2. Sewage disposal systems shall be located to maximize distances to regulated freshwater wetlands, tidal wetlands, ponds, streams, and other surface waters. The Contractor shall refer to the Local Health Department standards for specific separation distance requirements.

F. House Connections: All house connections shall be straight; there shall be no bends in sewer lines to the septic tank or grease trap. If bends are unavoidable, then the following additional criteria shall apply:

1. For bends greater than 10 feet from the building foundation as measured along the length of the sewer pipe, an approved manhole will be required where the pipe changes direction.

2. For bends within 10 feet of the building foundation measured along the length of the sewer pipe, no fittings greater than 45 degrees shall be installed. If a directional change greater than 45 degrees is required, a minimum of five foot length of pipe shall be installed between fittings. The maximum permitted change in alignment of the sewer line shall be 90 degrees as measured along the axis of the starting pipe.

3. Cleanouts are required at any bend within 10 feet from the building or every 75 feet along the length of the house connection.

G. Sewer Main / Lateral Sewer Requirements: Sewer main and lateral sewers shall have a uniform slope and be laid with a straight alignment, without bends. When required, approved manholes may be utilized where sewers change direction or slope. House or building sewers shall be connected to main or lateral sewers with approved wye fittings. Sewers shall be provided with manholes at intervals not to exceed 400 feet. Sewer main and lateral sewers shall have a minimum diameter of eight inches, and shall have a minimum slope of 0.4%. Ten inch diameter sewers shall have a minimum slope of 0.28%. Sewer main and lateral sewers that have less than 2 foot of cover or are not placed on virgin soil shall be constructed of ductile iron pipe. Sewer main and lateral sewers that have between 2 foot and 4 foot of cover shall be constructed of DR18 or ductile iron pipe. Sewer main and lateral sewers that have over 4 foot of cover may utilize SDR35 pipe.

H. Installation and Backfilling of Sewer Mains/ Lateral Sewers:

1. The width of trenches shall be adequate to allow sewer pipe to be laid and joined properly and to allow bedding and haunching to be placed and compacted to adequately support the pipe.

2. The embedment material around the PVC pipe shall be installed in layers not exceeding six inches. The embedment material shall be Class I, Class II, or Class III. Class I material shall conform to the following standards: minimum particle size ¾ inches, not less than 50% weight of material shall pass the 3/8 inch sieve. Class II material is defined as coarse sands and gravels with maximum particle size of 40 mm (1/2 inch), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Unified Soil Classification Types GW, CP, SW, SP are included in this Class. Class III material is defined as fine sand and clayey gravels, including fine sands, sand-clay mixtures,

and gravel-clay mixtures. All backfill material within one foot horizontally and one foot above the crown of the pipe shall be placed by hand and requires hand compaction.

3. Each layer of Class II and Class III material shall be compacted to a minimum density of ninety-five (95) percent of maximum density of the soil as determined by the Standard Proctor Test AASHTO Designation T-99.

4. For additional requirements concerning the installation of PVC sewer pipe, refer to ASTM Standard D-2321, *"Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications"*.

5. Testing – Deflection testing of every section of sewer main or lateral sewers, constructed of PVC, is required by the Local Health Department. The total vertical wall deflection of the PVC pipe, as determined by testing not earlier than 30 days after placement and compaction of the final backfill, shall not exceed four (4) percent of the inside pipe diameter. The deflection shall be checked by manually pulling a "GO – NO GO" deflection testing mandrell through the pipe. The Contractor shall conduct the tests under the observation of the certifying Engineer/Architect.

I. Separation of Sewer and Water Lines:

1. Parallel Installation: Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main or lateral. The distance shall be measured edge to edge.

2. If it is not practical to maintain a horizontal separation of ten feet, the Local Health Department may allow a deviation on a case-by-case basis. Such deviation may allow for the installation of the sewer to be a minimum of 5 feet to a water main or a lateral, provided that the bottom of the water main or lateral is at least 18 inches above the top of the sewer line.

J. Separation of Sewer and Drainage Lines:

1. Sewers shall be laid at least 5 feet horizontally from any existing or proposed drainage line. The distance shall be measured edge to edge.

2. In the event that the drainage pipe must cross over the sewer line, the sewer line must be constructed of ductile iron pipe, unless a separation distance of 18 or more inches is maintained.

3. In the event that the sewer line must cross over the drainage line, the sewer line shall be constructed of ductile iron pipe for a distance of 3 feet horizontally into virgin soil.

4. If perimeter roof drainage piping is installed near the face of the building, all house connections must be constructed of ductile iron pipe for 10 feet from the building.

K. Construct pipe lines of full length sections of pipe specified. Install horizontal pipe to a uniform grade.

L. Keep inside of pipe clean at all times.

M. Make joints between ductile-iron pipe and other types of pipe with standard manufactured ductile-iron adapters and fittings.

N. Asbestos cement pipe and fittings not permitted.

O. Site Contractor shall be responsible for the installation of all components beyond five (5) feet from building perimeter (or existing outfall line). All piping inward from this point shall be the responsibility

of the Plumbing Contractor. Do not lay any sanitary lines closer horizontally than 10 feet to a water main or service line. Where sanitary lines pass above waterlines, encase such lines in concrete for a distance of 10 feet on each side of the crossing or substitute rubber gasketed pressure pipe for the pipe being used for the same distance. Where sanitary lines pass below water lines, lay pipe so that no joint in the line will be closer than 3 feet horizontally to the water line.

P. Site and Plumbing Contractors shall coordinate their operations to ensure a smooth transition between each other's work.

Q. Site Contractor shall be responsible for maintaining the minimum separations between sanitary system components and other subsurface utilities and structures. ***Any and all crossings shall maintain minimum separations/methods as prescribed by the local health department or other agency having jurisdiction.***

R. Septic Tank Requirements – All conventional subsurface and/or alternative sewage disposal systems shall contain a septic tank as a part of the overall sanitary disposal system design. Septic tanks shall be located below grade and outside the building in either paved or unpaved areas. Septic tanks shall be located in areas that are easily accessible for routine inspection and maintenance. Refer to Local Health Department requirements for additional siting requirements.

1. Septic tanks shall be designed to hold two day's Design Sewage Flow, with a minimum capacity of 1,200 gallons. The Design Sewage Flow for the project must be calculated from the design standards of the Local Health Department.

    a. All single unit septic tanks shall be cylindrical in shape, and shall meet the following requirements:

        1) Minimum outside diameter cylindrical septic tank shall be 8 feet and the maximum outside diameter shall be 12 feet.

        2) Minimum liquid depth of any cylindrical septic tank shall be 4 feet. Liquid depth is the effective depth of the tank below the outlet pipe.

        3) Eight (8) foot diameter tanks shall have a maximum liquid depth of 5 feet.

        4) Ten (10) foot diameter tanks shall have a maximum liquid depth of 6 feet.

        5) Twelve (12) foot diameter tanks shall have a maximum liquid depth of 7 feet.

        6) There shall be a maximum number of three (3) outlet pipes from the septic tank. All outlet pipes shall be set at the same elevation.

    b. All two-unit septic tanks shall meet the above single unit requirements, plus:

        1) Units shall be connected with three (3)-8 inch diameter pipes placed such that the center lines of the pipes are 18 inches below the liquid level of the tank. The three connecting pipes shall be spaced 20 inches on centers. Each unit shall the same diameter and liquid depth.

    c. All multiple-unit septic tanks shall meet the above single unit requirements. Multiple unit septic tanks shall require the following:

        1) When three or more individual septic tanks are utilized within one system, they shall be placed on a common reinforced concrete slab at least 6 inches thick.

        2) All units shall be connected with two (2)-8 inch diameter pipes placed such that the

center lines of the pipes are 18 inches below the liquid level of the tank. Each connecting pipe set shall be spaced 20 inches on centers.

3) Each unit shall have the same diameter and liquid depth.

3.02 FIELD QUALITY CONTROL

A. Water Supply Systems: Test water distribution system pipe sizes installed below grade and outside building in accordance with PCNYS Section 312 requirements and the following procedures:
   1. All pipe work shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe (150 psi) and maintain said pressure for not less than two hours.

   2. Furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA Specification C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, meter shall be tested, sealed, and approved by applicable governing authority at the Contractor's expense.

   3. Locate and repair all leaks and repeat tests until test results are satisfactory and in compliance with this section.

   4. Furnish copy of results of meter test and hydrostatic pressure test to Owner upon completion of water distribution backfilling operations.

B. Sanitary Sewer Systems: Test sanitary sewer system to meet all requirements of the local governing authority. Perform all other required testing and inspections in accordance with the local Health Department or other agency having jurisdiction.

3.03 INSPECTION / BACKFILLING

A. All sequential inspections shall be conducted by the Local Health Department, coordinated by and through the Contractor. The inspector shall review all piping and section alignment, infiltration, or other defects in the installation, and the Contractor shall correct accordingly. The Contractor shall expeditiously conduct all required revisions to the satisfaction of the Health Department officials assigned to the project. The Contractor shall obtain all final written clearances from the Health Department inspectors allowing the systems to be backfilled, and shall provide copies of same to the Architect for his distribution to the Owner for future use and files.

B. The completed system shall be backfilled and covered with suitable soil following permission to do so by the Local Health Department. The property shall be graded to minimize surface drainage into the system. A maximum 5 percent slope downward shall be maintained for 20 feet horizontally from the nearest edge of the leaching portion of the pool(s) to the toe of the slope before tapering off to prevent seepage of the leachate through the slope. Dummy rings that are utilized to bring the system to grade shall be permitted to be placed at a lesser horizontal distance. Steep grades further than twenty feet from leaching pools shall be stabilized pursuant to local codes.

3.04 SITE RESTORATION AND CLEAN-UP

A. The Contractor shall clean up and legally remove from the site all rubbish and surplus material as it accumulates and shall not permit it to be scattered around the project site.

B. If this is a LEED Certified Project, disposal must comply with Division 01 Section 017419 “Construction Waste Management” for recycling construction waste.

C. The Contractor shall restore all areas of the site affected by the work to its original condition, inclusive of pavements, topsoil and grass, plantings or other ground cover.

3.05 GUARANTEE

A. Provide guarantee, stating that the work will remain free of defects in materials and workmanship for a minimum period of 10 years from the date of Substantial Completion and that upon failure of the installation to perform as warranted, the Contractor will repair or replace the defective work to conform with the requirements of the Contract Documents, including removal and replacement of other work as required.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 333000.11 – SANITARY SEWERAGE – (Suffolk County)

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish labor, materials, services, equipment, and other necessary items required for accomplishing the construction of the on-site sanitary drainage systems. This shall include, but not be limited to, the following:

1. On-site sanitary disposal systems, including all I/A Systems, septic tanks, grease traps, leaching pools, castings, covers, system piping and other sanitary components where indicated on the drawings.

2. Related items necessary to perform work, including all required coordination and interface between installing contractor and local Health Department, including but not limited to: permitting procedures, scheduling of required Health Department tests, inspections and closeout.

B. All sanitary Approvals to Construct shall be obtained and provided by the Architect/Engineer. Contractor shall perform all work necessary to install the proposed sanitary systems and related components in accordance with the proposed design as shown on the drawings. The contractor shall only utilize components and materials currently approved by the local Health Department or other agency having jurisdiction over the required installations. All items to be installed in strict accordance with the methods approved by the local Health Department.

C. Set lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

D. If this is a LEED Certified project, the work must comply with the requirements of the following related specifications sections:

1. **Division 01 Section 013563 "LEED Requirements" for recycled content and regional materials requirements, submittals, and additional LEED requirements.**

2. **Division 01 Section 017419 "Construction Waste Management" for recycling construction waste.**

E. Should actual field conditions differ from those shown on the Contract Documents, the Architect shall be immediately notified and no further operations will commence until further notice.

F. No changes are authorized without the Architect's and jurisdictional Health Department's written approval.

G. The Contractor shall be familiar with local Health Department rules and regulations and shall be responsible to arrange and coordinate any required inspections, create and submit as-builts drawings and any other documents necessary to obtain final approvals of constructed work.

1.02 RELATED REQUIREMENTS

A. Construction drawings.

B. Specification Sections:

1. Section 310000 – Earthwork
2. Section 321216 – Asphalt Paving
3. Section 329000 – Turf and Grasses
4. Section 331000 – Water Systems
5. Section 332400 – Storm Water Drainage, Structures and Castings
6. Section 334000.12 – Abandonment of Existing Sanitary and Stormwater Systems

C. Local Department of Health Services regulations.

D. Local governing authority and code requirements.

E. All necessary construction permits.

1.03 REFERENCE STANDARDS

A. All applicable ASTM Specifications, NYSDOT and ASSHTO standards.

B. Suffolk County Department of Health Standards.

C. Suffolk County Department of Public Works Sewer Permit Department.

1.04 SUBMITTALS

A. Submit manufacturer's product data and written specifications for all components: precast structures, cast iron frames and covers, pipe, valves, fittings, filter fabric, etc. in accordance with Section 013300.

1. Submit shop drawings to the Architect for approval of the following items:
2. Precast concrete sanitary system structures, grease traps, septic systems and leaching pools.
3. Perforated and non-perforated corrugated polyethylene pipe and fittings (for stormwater drainage systems).
4. Cast iron frames and covers.
5. Sanitary drainage piping.
6. Filter fabric.

B. Submittals shall include ASTM designations, AWWA certifications, and UL labels as required.

C. Obtain approval from the Architect before materials are ordered from the manufacturer.

D. **LEED Submittals: Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 013563 "LEED Requirements".**

1.05 FILING & APPLICATION FOR SANITARY SYSTEMS

A. It is the full intention of this project for the Local Department of Health to be completely involved during the installation of the sanitary sewage disposal systems designed. The Installing Contractor shall initiate contact with the Department of Health for inspection of the designed system. The Contractor shall be completely responsible for the coordination and installation of the designed system, as well as proper contact and coordination with the Department of Health.

B. Installations of new, and modifications to existing systems shall not occur without proper notification and scheduling with the Department of Health for required inspections. Installed components shall not be backfilled until so authorized after proper inspection by the Department of Health. The

Contractor shall be present at all inspections and backfilling procedures.

C. As a condition of the contract, the Contractor will be required to obtain a Permit to Operate from the Department of Health prior to contract closeout. The Architect will require 1 original and 3 copies of the Permit to Operate prior to issuing Substantial Completion of the project.

D. At the end of this Section is a copy of the Suffolk County Department of Health Services' Instructions for Obtaining Final Health Department Approval of Constructed Projects for Other Than Single Family Residences. If this project is regulated by another agency, the Contractor is responsible to meet their requirements and to seek out similar information. It is the Contractor's responsibility to contact the Department to arrange inspections of the sewage disposal facilities prior to backfilling. These include inspections of sewage collection / disposal systems, and final grading as shown on the approved plans. In certain cases, inspections of the soil excavations for sewage disposal systems as well as other inspections, may be required. The Department must be notified at least 48 hours in advance of scheduled backfilling.

E. The Health Department reference number and tax map number (or similar identifying marks as may be required by local regulatory agencies) must be clearly noted on all correspondence or documents submitted by the Contractor.

F. Contractor shall supply four (4) prints of an as-built plan of the subject project for the Health Department showing the information as detailed within the enclosed attachment. As-built information shall also be submitted to the Architect's office, including triangulation plotting and inverts of all existing piping and structures. As-built information shall also include all existing manhole covers and access points.

G. The Contractor shall note well that abandoned systems or systems scheduled for removal will require complete testing of adjacent soils and existing tank contents in full conformance with Department of Health Standards for contamination testing & abatement. Written proof of compliance with these requirements shall be submitted to the Architect's office prior to request for Substantial Completion review.

H. The Contractor shall submit to the Architect's office a certification letter (on company letterhead) which details an inventory of the components of the system installed, as well as the date of the Health Department inspections.

I. If a subsurface sewage disposal system is to be installed, the Contractor shall submit a certificate from a licensed sewage disposal installer, attesting that the system has been constructed according to the criteria of the local Department of Health Services.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in ample time to facilitate the work as under this Section.

B. Store and handle all materials in accordance with the manufacturer's recommendations.

1.07 QUALITY ASSURANCE

A. Environmental Agency Compliance: Comply with regulations pertaining to potable water and sanitary sewage systems.

B. Unless otherwise instructed, all work is to be observed by the Architect/Engineer, and tests and observation work are to meet his approval at each stage prior to backfilling. ***When public authorities require observation and approval by, or supervision of, the Work is required, comply with their requirements. Re-excavate any Work covered before observation and approval by local jurisdictional agencies at no additional cost to the Owner.***

C. Install pipe and fittings in strict accordance with best acceptable practice to insure proper functioning, freedom from trouble, and neatness of appearance.

D. Provide proper fittings for the installation of, and connection to sewer lines. Where an underground branch connection is required, provide a “Y” branch and 30-degree curve-type fitting. Connections made by cutting holes in pipe will not be permitted.

E. Prior to final observation, flush sewers with water in sufficient volume to obtain free flow through each line. Remove all obstructions and correct defects discovered.

F. Verify all connection requirements with the utility owner(s).

PART 2 - MATERIALS

2.01 CONSTRUCTION MATERIALS REQUIREMENTS

A. General – All components used in the sewage disposal system shall comply with the N.Y.S.P.C and with the appropriate National Sanitation Foundation (NSF), the American Society of Testing Materials (ASTM), the American Association of Highway and Traffic Office, and/or the American Water Works Association (AWWA) requirements. Concrete used in the construction of sewage disposal system components shall conform to ASTM C-33 and ASTM C-150 standards. Concrete reinforcement shall conform to ASTM A-185 and ASTM A-615 as applicable. All materials shall be identified as to manufacturer and have identification visible at the time of inspection.

2.02 SANITARY DISPOSAL SYSTEM

A. All septic tank components (i.e. – slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

B. Grease Traps: All restaurants and/or food preparation establishments are required to install a grease trap for the kitchen or food preparation area. A grease trap is considered part of the equipment necessary to obtain a Permit to Operate a Food Establishment pursuant to the Local County Sanitary Code. Grease traps must be cleaned and maintained on a regular basis in order to insure proper functioning ad insect-free performance. Grease traps shall be located below grade and outside the building preceding the septic tank or sewer line. Only discharges from the kitchen or food preparation areas may be piped to grease traps. Grease traps shall be located in areas that are easily accessible for routine inspection and maintenance.

1. All grease trap components (i.e. – slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

C. Leaching Pools: Leaching pools must be installed in areas that are easily accessible for routine inspection, maintenance, replacement or expansion. Refer to Local Health Department guidelines for additional requirements concerning the location of leaching pools.

1. The maximum permissible depth of a precast concrete leaching pool is twenty-five feet from finished grade. The minimum permissible effective depth of any leaching pool shall be three feet.

2. The minimum vertical separation distance from the bottom of the leaching pools to the highest recorded groundwater elevation shall be 3 feet for all new leaching pools installed.

3. All leaching pools (i.e.–slabs, domes, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

D. Manholes: Manholes are used as a part of a sewage disposal and collection systems to distribute equal volumes of sewage, to allow for access, or to collect and re-distribute sewage.

1. All manholes (i.e.–slabs, covers, etc.) shall be constructed of precast reinforced concrete and designed to be traffic bearing to meet the requirements of AASHTO H-20 loading.

E. Gravity Sewer Lines: Gravity sewer lines and fittings shall meet or exceed ASTM Standard D-3034 for PVC sewer pipe with a minimum SDR 35 rating, unless otherwise indicated.

1. PVC pipe and fittings shall be provided with integral bells and spigots and rubber sealing tings. The sealing rings shall meet the requirements of ASTM Standard F-4&7. All sewer lines shall be straight, and couplings shall be securely installed and be watertight.

2. All sewer lines shall have a minimum diameter of four (4) inches.

F. House Connections: A house connection is defined as the portion of the gravity sewer line which extends from the face of the building to the sewage disposal or sewer system.

1. There shall be a minimum two (2) foot length of cast iron sewer line extending through the foundation.

2. House connections shall have a minimum diameter of 4 inches, unless otherwise noted; house connections serving two or more commercial or multiple residential units shall have a minimum diameter of 6 inches.

3. House connections shall have a minimum pitch of one-quarter inch per foot.

4. Slip ring connectors of the proper type shall be used at the cast iron joint. If required, a flexible PVC coupling with stainless steel bands may be used to connect cast iron pipe to PVC house connections. The flexible coupling and bands shall conform to ASTM C1173.

5. All house connections shall be provided with a clean-out at the face of the building.

G. Castings and covers shall be extra heavy cast iron and steel of the type specified on the contract drawings, conforming to the requirements of the municipality having jurisdiction.

H. Polyvinyl Chloride Sanitary Sewer Pipe (unless otherwise noted on approved construction plans):

1. Pipe and fittings shall comply with ASTM D 3034-78 or D949-86, and shall have a pipe diameter to wall thickness ratio (SDR) of 35 minimum. Pipe shall be ASTM Type PSM, continually marked with manufacturer's name, pipe size, cell classifications, SDR rating, and ASTM D3034 classification.

2. Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

3. Furnish factory-fabricated pipe fittings of the highest quality and of he same type and class of material as the pipe.

4. At the main sanitary pipe transition between the plumber and site contractor, use non-shear high strength PVC elastomeric couplings when jointing non-similar materials.

I. Ductile Iron Sanitary Sewer Pipe (DIP) and Fittings:

1. Ductile iron pipe shall be centrifugally cast, conforming to the requirements of ANSI, A21.51 (AWWA C151).

2. Pipe and fittings shall be Pressure Class 150 psi and shall have a minimum wall thickness of Class 53 pipe.

3. Fittings shall be cast iron or ductile iron conforming to the requirements of ANSI A21.10 (AWWA C110).

4. All pipe joints shall be either mechanical joints or push-on joints. Joints for valves and fittings may be flanged. Mechanical joints, push-on joints and gaskets shall conform to the requirements of ANSI A21.11 (AWWA C111).

5. All gaskets for mechanical joints shall be lead-tipped gaskets.

6. Flanged joints shall conform to the requirements of ANSI A21.15 (AWWA C115) and ANSI B16.1.

7. Lining: All pipe and fittings shall be cement lined in accordance with ANSI A21.4 (AWWA C104). The lining shall be centrifugally applied and have a bituminous sealer. The cement lining shall be standard thickness.

8. All pipe and fittings shall be coated on the outside at the point of manufacture with a coal tar pitch varnish (Pipe dip). The coating shall average one-and-one-half (1½) to two (2) mil dry film thickness.

9. Pipe and fittings shall be encased in polyethylene tubes or sheets in accordance with ANSI A21.5 (AWWA C105). The polyethylene tubes shall have a minimum thickness of eight (8) mil.

J. Cleanouts, including those in vitrified clay lines, shall be iron body type with extra heavy bronze plugs.

K. Manholes:

1. Construct manholes of precast concrete sections as required by the drawings to size, shape, and depth indicated, but never less than 2'-0" inside diameter.

2. Precast Construction (septic tanks, leaching pools, grease traps, pool wrap, backfill material, grouts, castings, etc.): Construction shall comply with the requirements of the Local County Department of Health Services, and shall be of the type specified on the Contract Drawings.

3. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls and point up irregularities and rough edges with non-shrinking grout.

4. Inverts: Shape inverts for smooth flow across structure floor as shown on the drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

5. Cast Iron Frames, Covers, and Grates: After completion of manhole or inlet, set frame in full mortar bed and adjust to required elevation.

L. In all instances, use only new materials.

PART 3 - EXECUTION

3.01 INSTALLATION – SANITARY SYSTEM & PIPING

A. All installations shall be in accordance with plans as approved by the Local Health Department.

B. Provide all necessary excavation, trenching, shoring, and backfilling required for the installation of all septic tanks and leaching structures and for the proper laying of all pipe. Do not backfill until installation has been inspected by the Local Health Department and approved. Install system components and pipe promptly after excavation, schedule with inspecting agency on-site to approve, to keep the excavation open for as short a time as possible.

C. Sewage disposal systems shall not be located:

1. In any area subject to imminent erosion, which cannot be controlled so as to protect the sewage disposal system(s);

2. In areas where the highest recorded groundwater level is less than one foot below the original ground surface;

3. In areas with existing slopes greater than 15%, unless the site can be properly graded in accordance with the standards of the Local Health Department.

4. In areas where the existing subsoils contain meadow mat, bog, silts, clays or other impervious material extending below the groundwater table;

5. In areas where the groundwater conditions are not conducive to the proper functioning of subsurface sewage disposal systems;

6. Where topography concentrates runoff onto or into the area where the system is proposed;

7. In any area or under any part of a building, or other improvements that does or may prevent reasonable access for repair or maintenance of the system;

8. In any area which may reasonably be expected to create a public health risk.

D. Site Condition Requirements: Sewage disposal systems shall be located:

1. On land owned in fee by the applicant (except for Community or Municipal Sewage Treatment Systems);

2. On the same parcel as the building(s) to be serviced (except for Community or Municipal Sewage Treatment Systems);

3. In an area which is easily accessible for purposes of maintenance and/or replacement of sewage disposal and treatment system components;

4. In accordance with the minimum separation distances and other conditions dictated by the Local Health Department.

E. Other Site Specific Considerations: To protect the public water supply and the benefits that freshwater wetlands, tidal wetlands, streams, and other surface waters provide, all projects may be subject to a separate site review by the Local Health Department. The following criteria may apply to these sites:

1. Sewage disposal systems shall be located to maximize distances to public water supply wells.

If the Local Health Department determines that insufficient distance exists to protect the well, further treatment may be required.

2. Sewage disposal systems shall be located to maximize distances to regulated freshwater wetlands, tidal wetlands, ponds, streams, and other surface waters. The Contractor shall refer to the Local Health Department standards for specific separation distance requirements.

F. House Connections: All house connections shall be straight; there shall be no bends in sewer lines to the septic tank or grease trap. If bends are unavoidable, then the following additional criteria shall apply:

1. For bends greater than 10 feet from the building foundation as measured along the length of the sewer pipe, an approved manhole will be required where the pipe changes direction.

2. For bends within 10 feet of the building foundation measured along the length of the sewer pipe, no fittings greater than 45 degrees shall be installed. If a directional change greater than 45 degrees is required, a minimum of five foot length of pipe shall be installed between fittings. The maximum permitted change in alignment of the sewer line shall be 90 degrees as measured along the axis of the starting pipe.

3. Cleanouts are required at any bend within 10 feet from the building or every 75 feet along the length of the house connection.

G. Sewer Main / Lateral Sewer Requirements: Sewer main and lateral sewers shall have a uniform slope and be laid with a straight alignment, without bends. When required, approved manholes may be utilized where sewers change direction or slope. House or building sewers shall be connected to main or lateral sewers with approved wye fittings. Sewers shall be provided with manholes at intervals not to exceed 400 feet. Sewer main and lateral sewers shall have a minimum diameter of eight inches, and shall have a minimum slope of 0.4%. Ten inch diameter sewers shall have a minimum slope of 0.28%. Sewer main and lateral sewers that have less than 2 foot of cover or are not placed on virgin soil shall be constructed of ductile iron pipe. Sewer main and lateral sewers that have between 2 foot and 4 foot of cover shall be constructed of DR18 or ductile iron pipe. Sewer main and lateral sewers that have over 4 foot of cover may utilize SDR35 pipe.

H. Installation and Backfilling of Sewer Mains/ Lateral Sewers:

1. The width of trenches shall be adequate to allow sewer pipe to be laid and joined properly and to allow bedding and haunching to be placed and compacted to adequately support the pipe.

2. The embedment material around the PVC pipe shall be installed in layers not exceeding six inches. The embedment material shall be Class I, Class II, or Class III. Class I material shall conform to the following standards: minimum particle size ¾ inches, not less than 50% weight of material shall pass the 3/8 inch sieve. Class II material is defined as coarse sands and gravels with maximum particle size of 40 mm (1/2 inch), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Unified Soil Classification Types GW, CP, SW, SP are included in this Class. Class III material is defined as fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. All backfill material within one foot horizontally and one foot above the crown of the pipe shall be placed by hand and requires hand compaction.

3. Each layer of Class II and Class III material shall be compacted to a minimum density of ninety-five (95) percent of maximum density of the soil as determined by the Standard Proctor Test AASHTO Designation T-99.

4. For additional requirements concerning the installation of PVC sewer pipe, refer to ASTM Standard D-2321, *"Underground Installation of Thermoplastic Pipe for Sewers and Other*

Gravity-Flow Applications".

5. Testing – Deflection testing of every section of sewer main or lateral sewers, constructed of PVC, is required by the Local Health Department. The total vertical wall deflection of the PVC pipe, as determined by testing not earlier than 30 days after placement and compaction of the final backfill, shall not exceed four (4) percent of the inside pipe diameter. The deflection shall be checked by manually pulling a "GO – NO GO" deflection testing mandrell through the pipe. The Contractor shall conduct the tests under the observation of the certifying Engineer/Architect.

I. Separation of Sewer and Water Lines:

1. Parallel Installation: Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main or lateral. The distance shall be measured edge to edge.

2. If it is not practical to maintain a horizontal separation of ten feet, the Local Health Department may allow a deviation on a case-by-case basis. Such deviation may allow for the installation of the sewer to be a minimum of 5 feet to a water main or a lateral, provided that the bottom of the water main or lateral is at least 18 inches above the top of the sewer line.

J. Separation of Sewer and Drainage Lines:

1. Sewers shall be laid at least 5 feet horizontally from any existing or proposed drainage line. The distance shall be measured edge to edge.

2. In the event that the drainage pipe must cross over the sewer line, the sewer line must be constructed of ductile iron pipe, unless a separation distance of 18 or more inches is maintained.

3. In the event that the sewer line must cross over the drainage line, the sewer line shall be constructed of ductile iron pipe for a distance of 3 feet horizontally into virgin soil.

4. If perimeter roof drainage piping is installed near the face of the building, all house connections must be constructed of ductile iron pipe for 10 feet from the building.

K. Construct pipe lines of full length sections of pipe specified. Install horizontal pipe to a uniform grade.

L. Keep inside of pipe clean at all times.

M. Make joints between ductile-iron pipe and other types of pipe with standard manufactured ductile-iron adapters and fittings.

N. Asbestos cement pipe and fittings not permitted.

O. Site Contractor shall be responsible for the installation of all components beyond five (5) feet from building perimeter (or existing outfall line). All piping inward from this point shall be the responsibility of the Plumbing Contractor. Do not lay any sanitary lines closer horizontally than 10 feet to a water main or service line. Where sanitary lines pass above waterlines, encase such lines in concrete for a distance of 10 feet on each side of the crossing or substitute rubber gasketed pressure pipe for the pipe being used for the same distance. Where sanitary lines pass below water lines, lay pipe so that no joint in the line will be closer than 3 feet horizontally to the water line.

P. Site and Plumbing Contractors shall coordinate their operations to ensure a smooth transition between each other's work.

Q. Site Contractor shall be responsible for maintaining the minimum separations between sanitary system components and other subsurface utilities and structures. ***Any and all crossings shall maintain minimum separations/methods as prescribed by the local health department or other agency having jurisdiction.***

R. Septic Tank Requirements – All conventional subsurface and/or alternative sewage disposal systems shall contain a septic tank as a part of the overall sanitary disposal system design. Septic tanks shall be located below grade and outside the building in either paved or unpaved areas. Septic tanks shall be located in areas that are easily accessible for routine inspection and maintenance. Refer to Local Health Department requirements for additional siting requirements.

1. Septic tanks shall be designed to hold two day's Design Sewage Flow, with a minimum capacity of 1,200 gallons. The Design Sewage Flow for the project must be calculated from the design standards of the Local Health Department.

    a. All single unit septic tanks shall be cylindrical in shape, and shall meet the following requirements:

        1) Minimum outside diameter cylindrical septic tank shall be 8 feet and the maximum outside diameter shall be 12 feet.

        2) Minimum liquid depth of any cylindrical septic tank shall be 4 feet. Liquid depth is the effective depth of the tank below the outlet pipe.

        3) Eight (8) foot diameter tanks shall have a maximum liquid depth of 5 feet.

        4) Ten (10) foot diameter tanks shall have a maximum liquid depth of 6 feet.

        5) Twelve (12) foot diameter tanks shall have a maximum liquid depth of 7 feet.

        6) There shall be a maximum number of three (3) outlet pipes from the septic tank. All outlet pipes shall be set at the same elevation.

    b. All two-unit septic tanks shall meet the above single unit requirements, plus:

        1) Units shall be connected with three (3)-8 inch diameter pipes placed such that the center lines of the pipes are 18 inches below the liquid level of the tank. The three connecting pipes shall be spaced 20 inches on centers. Each unit shall the same diameter and liquid depth.

    c. All multiple-unit septic tanks shall meet the above single unit requirements. Multiple unit septic tanks shall require the following:

        1) When three or more individual septic tanks are utilized within one system, they shall be placed on a common reinforced concrete slab at least 6 inches thick.

        2) All units shall be connected with two (2)-8 inch diameter pipes placed such that the center lines of the pipes are 18 inches below the liquid level of the tank. Each connecting pipe set shall be spaced 20 inches on centers.

        3) Each unit shall have the same diameter and liquid depth.

3.02 FIELD QUALITY CONTROL

A. Water Supply Systems: Test water distribution system pipe sizes installed below grade and outside building in accordance with PCNYS Section 312 requirements and the following procedures:

1. All pipe work shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe (150 psi) and maintain said pressure for not less than two hours.

2. Furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA Specification C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, meter shall be tested, sealed, and approved by applicable governing authority at the Contractor's expense.

3. Locate and repair all leaks and repeat tests until test results are satisfactory and in compliance with this section.

4. Furnish copy of results of meter test and hydrostatic pressure test to Owner upon completion of water distribution backfilling operations.

B. Sanitary Sewer Systems: Test sanitary sewer system to meet all requirements of the local governing authority. Perform all other required testing and inspections in accordance with the local Health Department or other agency having jurisdiction.

3.03 INSPECTION / BACKFILLING

A. All sequential inspections shall be conducted by the Local Health Department, coordinated by and through the Contractor. The inspector shall review all piping and section alignment, infiltration, or other defects in the installation, and the Contractor shall correct accordingly. The Contractor shall expeditiously conduct all required revisions to the satisfaction of the Health Department officials assigned to the project. The Contractor shall obtain all final written clearances from the Health Department inspectors allowing the systems to be backfilled, and shall provide copies of same to the Architect for his distribution to the Owner for future use and files.

B. The completed system shall be backfilled and covered with suitable soil following permission to do so by the Local Health Department. The property shall be graded to minimize surface drainage into the system. A maximum 5 percent slope downward shall be maintained for 20 feet horizontally from the nearest edge of the leaching portion of the pool(s) to the toe of the slope before tapering off to prevent seepage of the leachate through the slope. Dummy rings that are utilized to bring the system to grade shall be permitted to be placed at a lesser horizontal distance. Steep grades further than twenty feet from leaching pools shall be stabilized pursuant to local codes.

3.04 SITE RESTORATION AND CLEAN-UP

A. The Contractor shall clean up and legally remove from the site all rubbish and surplus material as it accumulates and shall not permit it to be scattered around the project site.

B. If this is a LEED Certified Project, disposal must comply with Division 01 Section 017419 “Construction Waste Management” for recycling construction waste.

C. The Contractor shall restore all areas of the site affected by the work to its original condition, inclusive of pavements, topsoil and grass, plantings or other ground cover.

3.05 GUARANTEE

A. Provide guarantee, stating that the work will remain free of defects in materials and workmanship for a minimum period of 10 years from the date of Substantial Completion and that upon failure of the installation to perform as warranted, the Contractor will repair or replace the defective work to conform with the requirements of the Contract Documents, including removal and replacement of other work as required.

END OF SECTION

<u>Note</u>: Directly following this sheet is a copy of the Suffolk County Department of Health Services Office of Wastewater Management form WWM-019 (08/05) - *Instructions for Obtaining Final Health Department Approval of Constructed Projects for Other Than Single Family Residences* - it is attached as a reference tool for use by the Contractor. The Contractor shall obtain original / additional copy from the Office of Wastewater Management. <u>Projects in other jurisdictions will require alternate instructions which shall be obtained by the Contractor, and followed to maintain that jurisdiction's requirements</u>.

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
OFFICE OF WASTEWATER MANAGEMENT
360 YAPHANK AVENUE, SUITE 2C
YAPHANK, NY 11980
(631) 852-5700

INSTRUCTIONS FOR OBTAINING FINAL HEALTH DEPARTMENT APPROVAL OF CONSTRUCTED PROJECTS FOR OTHER THAN SINGLE FAMILY RESIDENCES

It is the applicant's responsibility to call the Department to arrange inspections of the sewage disposal and/or water supply facilities prior to backfilling. These include inspections of sewage collection / disposal systems and water supply system components and piping, and final grading as shown on the approved plans. In certain cases inspections of the soil excavations for sewage disposal systems as well as other inspections, may be required. The Department must be notified at least 48 hours in advance of scheduled backfilling.

Following satisfactory construction and inspection of the sewage disposal / sewage collection and water supply facilities, the following items are required for final approval:

1. Four (4) prints of an As-Built plan of the subject property, prepared by a licensed design professional or surveyor, showing the following information:

    a. The lot location, tax map number(s), lot area and metes/bounds description.
    b. The exact location, number of stories, dimensions, and gross floor area of all building(s).
    c. The exact location of sewage disposal system components. Give two (2) dimensions measured from the building corners to each cover at grade. For large systems. Provide measurements in a table format.
    d. The exact location of the private well, if applicable. Give two (2) dimensions measured from the building corners to the well.
    e. The exact location of the public water service lateral line(s), if applicable.
    f. The exact location of sewer line(s) from all buildings to the street, if applicable.
    g. The exact location of sewage collections system components, if applicable. This includes sewer piping, manholes, cleanouts, and building sewers. Inverts and sizes may be required.
    h. For projects served with private water distribution systems, the exact location of on-site water mains, services, valves, curb boxes, hydrants, RPZ devices and master meters must be shown.
    i. The exact location of storm drainage structures.

2. If a well has been installed as the potable water supply, then the applicant must submit a well water analysis completed within one year by a certified lab, and a well driller's certificate completed by a licensed well driller. If the well or water quality does not conform to standards, corrective measures will be required as described in the Department's "*Private Water System Standards"*.

3. If public sewers are utilized to serve the project, the applicant must also submit one (1) copy of the sewer line inspection approval from the sewer district. In districts operated by Suffolk County, one (1) original of Form S-9, duly executed by Suffolk County Department of Public Works, and one (1) copy of a Suffolk County Department of Public Works field sketch are required.

1. If public water is utilized to serve the project, a tap letter from the appropriate water district indicating that service has been completed to the building(s), will be required.

2. For projects served with private water distribution systems, bacteriological analyses of water samples collected after disinfection are required at locations specified by SCDHS.

3. If a subsurface sewage disposal system has been installed, the applicant must submit a certificate from a licensed sewage disposal installer, attesting that the system has been constructed according to the criteria of the SCDHS. Refer to **Certification of Sewage Disposal System by Installer**, form **WWM-078**. (If not licensed, the installer must contact the Suffolk County Office of Consumer Affairs at (631) 853-4596.)

4. In certain cases, the applicant will be required to submit a certification from a licensed design professional, attesting that all components of the sewage disposal or sewage collection systems have been properly inspected and constructed according to the approved plans and permit conditions> Refer to **Certification of Constructed Works by Design Professional**, form **WWM-073**.

5. In certain cases, including projects involving Multiple Residential Units, the applicant will be required to submit a **Certification of Carbon Monoxide Alarm Installation** (form **WWM-075**). Refer to *"Carbon Monoxide Alarm Standards"* for details regarding carbon monoxide detector requirements.

6. For situations involving the abandonment of existing sewage disposal systems, the applicant must submit a **Certification of Sewage Disposal System Abandonment**, form **WWM-080**, and/or a **Certification of Constructed Works by Design Professional**, form **WWM-073**.

For a list of specific items required for Final Approval of a certain project, applicants should refer to the Permit Conditions (form WWM-016) issued with their stamped approved plans at the time of Approval to Construct.

THE HEALTH DEPARTMENT REFERENCE NUMBER AND TAX MAP NUMBER MUST BE ON ALL CORRESPONDENCE OR DOCUMENTS SUBMITTED.

PHOTOCOPIES OF DOCUMENTS WILL NOT BE ACCEPTED

DIVISION 33 – UTILITIES

SECTION 334000 – STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Supplementary General Conditions", which form a part hereof whether attached hereto or not.

B. Work Included: Furnish labor, materials, equipment, and appurtenances required to perform all work including, but not limited to, the following:

1. Provision and installation of precast catch basins, leaching basins, and other drainage structures where indicated on the drawings.

2. Provision and installation of drainage piping.

1.02 REFERENCE STANDARDS

A. All applicable ASTM Specifications, NYSDOT and AASHTO standards, latest editions, shall apply.

1.03 RELATED SECTIONS

A. Section 310000 – Earthwork
B. Section 310001 – Site Work General Provisions
C. Section 312500 – Sediment and Erosion Control Procedures and Requirements
D. Storm Water Pollution Prevention Plan, if applicable.
E. If this is a LEED project, the work must comply with the requirements of the following related specifications sections:

1. Section 013563 “LEED Requirements” for additional LEED requirements.
2. Section 017419 “Construction Waste Management” for recycling construction waste.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in ample time to facilitate the work as under this section.

B. Store and handle materials in accordance with manufacturer’s recommendations.

1.05 SUBMITTALS FOR REVIEW

A. Submittals shall be in accordance with Section 013300.

B. Product Data: Submit manufacturer's specifications and product data for all materials specified herein. Obtain approval from the Architect before materials are ordered from the manufacturer.

C. Shop Drawings: Submit shop drawings or distributor's information to the Architect for approval of the following:

1. Precast concrete drainage structures and pre-formed plastic drain inlets.

2. Perforated and non-perforated corrugated polyethylene pipe and fittings.

3. Cast iron frames & grates/covers and combination curb box inlets.

4. Filter fabric.

D. LEED Submittals (if applicable): Submit recycled content and regional materials documentation for each type of product provided under work of this section in accordance with section 013563 – LEED Requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND DISTRIBUTORS

A. Precast concrete structures and products shall be as manufactured by AFCO Precast Corp., Coastal Pipeline Corp., Pelkowski Precast, Corp. or approved equal.

B. Pre-formed plastic drain inlets and accessories shall be Nyloplast Drainage Structures as manufactured by Advanced Drainage Systems, Inc. (ADS), 1-800-821-6710, www.adspipe.com, or approved equal.

1. Polyvinyl Chloride (PVC) Catchbasin:

a. PVC Catchbasins shall be offered in size 8” – 36” with custom configurations as specified by engineer.
b. Diameters: The nominal diameters shall be in accordance with ASTM F679 and ASTM D3034.
c. Heights: Catchbasin body shall be manufactured and supplied in custom heights up to a total of 84 inches (7 ft). In the event that addition height is needed, a riser will be supplied by the manufacturer.
d. Catchbasins to be custom manufactured according to plan details. Risers are needed for basins over 84 in (7ft) due to shipping restrictions. All excess height shall be cut to proper elevation in field.
e. Drainage connection stub joint tightness shall confirm to ASTM D3212 for corrugated HDPE (ADS N-12/Hancor Dual Wall), Polypropylene (ADS N-12 HP Sanitite) & PVC.
f. Adapters shall be mounted in varies angles from 0 to 360 degrees, while allowing for minimum angle between adapters.
g. Castings shall be ductile iron per ASTM A536 Grade 70-50-05 and shall be furnished by the same manufacture as drain basin.
h. Concrete collars shall be installed in traffic loading situations according to manufacturer’s installation recommendations on details.
i. Weirs shall be custom built from gage 304 stainless steel when specified on plans

C. Corrugated polyethylene pipe (CPP) and fittings shall be "N-12" with smooth interior walls as manufactured by Advanced Drainage Systems, Inc. (ADS), 1-800-821-6710, www.adspipe.com, or approved equal.

D. Cast iron frames & grates/covers and combination curb box inlets shall be as manufactured by Campbell Foundry Co., Harrison, New Jersey; Neenah Foundry Co., Neenah, Wisconsin; or approved equal.

E. Filter fabric shall be synthetic and rot proof. Unless specifically noted otherwise on the plans, where used primarily for drainage such as wrapping of leaching rings, perforated underdrain piping, French drains, etc., provide:

1. Mirafi Series 140NC as manufactured by TenCate (www.mirafi.com)

2. Series FX-40HS as manufactured by Carthage Mills (www.carthagemills.com)

3. Series US-100NW as manufactured by US Fabrics, Inc. (www.usfabrics.com) or equal.

Fabric shall meet the following minimum requirements:

Property	ASTM Test Method	Value
Grab Tensile Strength	D4632	100 lbs.
Elongation	D4632	50%
Trapezoidal Tear Strength	D4533	45 lbs.
CBR Puncture Strength	D6241	250 lbs.
UV Resistance (at 500 hrs.)	D4355	70%
Apparent Opening Size (AOS)	D4751	70 US Sieve
Permittivity	D4491	2.00 $sec^{(-1)}$
Flow Rate	D4491	140 gpm/sf
Mass (Typical)	D5261	4.0 oz/sy
Thickness (Typical)	D5199	60 mils

F. All structures/products shall meet AASHTO H-20 loading unless otherwise specified on the drawings.

2.02 PRECAST CONCRETE PRODUCTS

A. Strength: 4,000 psi @ 28 days.

B. Cement: ASTM C-150.

C. Aggregates: ASTM C-33.

D. Water: Pure and potable.

E. Reinforcement: ASTM A-615.

F. Welded Wire Fabric: ASTM A-185.

2.03 CORRUGATED POLYETHYLENE PIPING (CPP)

A. Piping products shall meet the requirements of ASTM D-3350 and AASHTO M-252 or M-294, latest edition.

B. Pipe shall be provided with couplings, elbows, and other connections to maintain alignment and insure tight flexible joints. The materials shall be of the same composition as the pipe. Unless otherwise noted, provide soil-tight joints of either bell & spigot configuration or split-couplers.

C. Each length of pipe shall be marked with the manufacturer's trade name, class, type, size, and date of manufacture.

D. Diameter and size of piping shall be as indicated on the drawings.

2.04 CAST IRON FRAMES AND GRATES

A. All cast-iron frames & grates/covers, and combination curb box inlets shall meet the requirements for casting M6A – Steel Castings, Grade N-i; or M8 Iron Castings, Class No. 30; or M 13 – Malleable Iron Castings, Grade 32501 at the Contractor’s option.

B. Grates located in plazas, sidewalks, roadways at drop curbs, or other area of pedestrian activity,

shall be ADA compliant.

C. Round manhole frames & covers/grates shall be 22” diameter, unless otherwise noted or shown on the drawings.

D. Rectangular inlet frames & grates shall be 24”x36”, unless otherwise noted or shown on the drawings.

E. Frames, grates, and covers that are warped or rock in the opinion of the Architect will be rejected and removed from the site.

2.05 BRICK CHIMNEY

A. Comply with the ASTM Standard Specifications for Sewer Brick, designated C32-58, for Grade 5A, hard brick, except that the mean of five tests for absorption shall not exceed eight percent weight.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install shoring, sheet piling, or other acceptable excavation stabilization as required by OSHA or other agencies having jurisdiction, or as required by proximity to existing site features.

B. Sides of holes and trenches shall be near vertical as possible. Bracing or sheeting shall not be removed until the proper level of backfill has been reached.

C. Under no circumstances shall the materials of this section be laid in water.

D. Excavation shall be by open cut from the surface. Leaching holes shall be approximately 3'-0" wider than the outside diameter of section to be installed. Leaching rings and piping shall be set on undisturbed earth. Any and all excess excavation shall be backfilled and thoroughly compacted.

E. After the area to be occupied by each structure has been excavated of all deleterious and impervious materials and acceptable, clean sand and gravel has been encountered, set structures, wrap in filter fabric, and then backfill per item G.

F. All unused pipe knock outs in precast walls must be bricked or concreted to provide full wall thickness.

G. Backfill around drainage inlets and drywells shall be placed on all sides simultaneously and shall be unified soil classification type GW, GP SW or SP. Native soils not meeting this classification shall not be utilized for backfill unless specifically approved by the Architect. Additional backfilling beyond or above the 3’-0” collar shall be done with coarse sand, fine gravel, loam, clean earth, or other excavated materials, free from stones and foreign matter. Backfilling around catch basins and manholes shall be done in accordance with Section 0310000 – Earthwork. Drywell and leaching collar backfill shall be placed in lifts not to exceed 12” in depth. Once backfill has reached the top of the uppermost leachable ring of the structure, the entire leaching collar shall be filled (flooded) with water to settle the leaching collar backfill. A visual inspection shall be done by a certified testing lab with report. Repeat this process until all settlement has occurred and the backfill has reached the top of the uppermost leaching ring. Backfill shall then be placed from the top of the upper leaching ring to subgrade, in compacted lifts not to exceed 12”, and should be tested for compaction by a certified test lab with report. Compaction shall be at least 95% in paved areas and 85% in landscape areas, of the modified proctor test, ASTM D 1557.

H. Piping Installation:

1. Installation shall be in accordance with ASTM Recommended Practice D2321, or as shown on the drawings and specified herein. Refer to specification section 310000 – Earthwork for trenching and bedding material specifications.

2. Width of pipe trenches shall be kept to a minimum, while providing adequate space for workmen to place and joint the pipes properly. In no case shall the width of trench be more than 18 inches greater than the diameter of the pipe measured at bell. Trenching practice shall be in accordance with ASTM D2321 and AASHTO Section 30.

3. Install pipe true to designed line and grade, adjusting bedding as required.

4. For bell & spigot joints, install with bells facing upstream. Wood blocking should be utilized to prevent damage during seating of connections.

5. Backfill with approved material from bedding to 12 inches over the pipe in 6 inch layers, thoroughly compacting around the pipe with hand and/or mechanical tamping devices. Backfill evenly on each side of pipe to assure there is no shifting of alignment. From 12 inches over pipe to subgrade, backfill with excavated native material, but allow no trash, debris, or stones to be incorporated in backfill.

6. In all locations where pipes are under paved areas, backfill with approved material from bedding to subgrade in 6-inch layers, thoroughly compacting around the pipe with hand and/or mechanical tamping devices. Backfill evenly on each side of pipe to assure there is no shifting of alignment.

7. Openings in structures cut for piping shall be no larger than 4” greater than outside pipe dimension. Grout full thickness of drainage structure wall at piping.

8. Piping shall protrude from inside face of structure a minimum of 2” and a maximum of 8”.

I. Frames and grates shall be set so that the top of the frame will be flush with finished grade. Frames shall be set in a full bed of stiff mortar with a minimum of three (3) courses of brick and mortar.

J. After backfilling, provide sufficient stakes, flags, etc. to outline the drainage inlets, drywells, and/or piping to prevent disturbance by the use of trucks and heavy equipment.

K. All drainage structures and piping shall be protected and thoroughly cleaned at the completion of the project by the Contractor. Any defacements shall be corrected or replaced as directed by the Architect, without additional cost to the Owner.

L. All existing cast iron covers located within the area of new work shall be adjusted to finished grade.

3.02 SITE RESTORATION AND CLEAN UP

A. The Contractor shall clean up and legally remove from the sites all rubbish and surplus material as it accumulates and shall not permit it to be scattered around the project sites.

1. If this is a LEED project, disposal must comply with Division 01 Section 017419 “Construction Waste Management” for recycling construction waste.

B. The Contractor shall restore all areas of the site affected by the work to its original condition, inclusive of pavements, topsoil and grass, plantings or other ground cover.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 334000.11 – CLEANING EXISTING STORM WATER DRAINAGE SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Under this work, the Contractor shall clean existing catch basins, manholes, drop inlets, leaching basins, storm drains, and culverts as indicated on the plans and/or as directed by the Engineer.

1.02 CONSTRUCTION DETAILS

A. All drainage system components which lie within the construction area shall be cleaned of silt and debris in a workmanlike manner and maintained clean as determined by the Engineer for the duration of the contract. Material removed from the culverts shall be disposed of off the contract limits. The Contractor shall execute care for and protect all trees, fences, and drainage system components within, or adjacent to, the work site. The Contractor shall replace in kind any system components or other facilities damaged by his operation at his own expense.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 334000.12 – ABANDONMENT OF EXISTING SANITARY AND STORM WATER SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Under this work, the Contractor shall abandon in place or remove (as shown on the drawings) any and all components comprising the sanitary sewage disposal systems and/or the on-site storm drainage systems.

B. All abandonment work of sanitary systems shall be in accordance with the latest requirements and regulations of the local authority having jurisdiction and the US EPA.

C. The contractor is responsible for ascertaining and coordinating any testing and inventorying required by the local authority having jurisdiction and the US EPA.

D. Structures shall be cleaned of all foreign material and backfilled with clean sand and gravel using adequate compaction methods to ensure no future settlement or void spaces within the structures.

E. Non-leaching structures shall be perforated so they will not retain liquids.

F. Portions of systems to be abandoned in place shall be disconnected and all piping capped or sealed.

G. The contractor is responsible for coordinating controlled inspections of backfilling activities.

H. The contractor is responsible for contacting the local authority having jurisdiction and the US EPA to coordinate any required abandonment inspections.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 334010 – STORM WATER DRAINAGE RETENTION STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes stormwater drainage systems for building roof drainage and site area drainage.

B. Work includes the installation of the StormTech Chamber Drainage System, or an approved equivalent.

C. Related work includes the installation of drainage inlet structures, manholes and outlet structures.

1.02 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete
B. Section 310000 – Earthwork
C. Section 310001 – Site Work General Provisions
D. Section 312500 – Erosion and Sediment Controls
E. Section 334000 – Storm Drainage Utilities

1.03 ABBREVIATIONS

A. PP: Polypropylene
B. HDPE: High Density Polyethylene
C. PE: Polyethylene
D. PVC: Polyvinyl Chloride
E. ASTM – American Society for Testing and Materials
F. AASHTO – American Association of State Highway and Transportation Officials
G. ADS – Advanced Drainage Systems Inc.
H. TSS – Total Suspending Solids

1.04 DEFINITIONS

A. Stormwater Chamber System: All products associated with the drainage system including but not limited to chambers, end caps, pipe, fittings, stone, geotextile, and drainage structures.

B. Subsurface Drainage System: Refers to the StormTech subsurface stormwater chamber system.

C. Manifolds and manifold piping refer to the piping system to inlet and outlet rows of chambers.

D. STORMTECH brand name is referred to as CHAMBER MANUFACTURER hereafter.

E. ADS and HANCOR brand names are considered interchangeable within this section.

1.05 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO LRFD Bridge Design Specifications Section 3 – Loads and Load Factors
2. AASHTO LRFD Bridge Design Specifications Section 12 – Buried Structures and Tunnel Liners

3. AASHTO M 43 – Standard Specification for Sizes of Aggregate for Road and Bridge Construction
4. AASHTO M 288 – Standard Specification for Geotextile Specification for Highway Applications
5. AASHTO M 294 – Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter

B. American Society for Testing and Materials (ASTM)

1. ASTM F 2418 or F 2922 Standard Specification for Polypropylene (PP) or Polyethylene (PE) Corrugated Wall Stormwater Collection Chambers
2. ASTM F 2787 Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers
3. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
4. ASTM F 2306 – Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

1.06 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings

1. A preinstallation meeting between StormTech representative and general contractor is recommended to discuss the chamber system installation.

    a. StormTech offers installation consultations to installing contractors.
    b. Contact StormTech at least 30 days prior to system installation to arrange a pre-installation consultation.

B. Sequencing

1. Contractor is responsible for coordinating the installation of the subsurface stormwater chamber system with the installation of permanent structures on site.

    a. Construction loads for permanent structures may require the subsurface chamber system to be installed after the permanent structure(s) on site.

2. Coordinate stormwater chamber system connections to off site storm sewer with the appropriate agency having jurisdiction.

3. Coordinate stormwater chamber system connections to existing on-site storm drain.

4. Coordinate with building roof drainage systems.

5. Coordinate with other utility work.

1.07 SUBMITTALS

A. The following shall be submitted by contractor in accordance with Submittal Procedures:

1. Product Specifications for the following:

    a. StormTech chambers and end caps
    b. ADS PE pipe

2. Product Installation Instructions for the following:

a. StormTech chambers and end caps
b. ADS PE pipe

3. Inspection and Maintenance Instructions for the following:

a. StormTech Isolator™ Row

1.08 QUALITY ASSURANCE

A. Regulatory Agency Approvals:

1. Environmental agency compliance: Comply with regulations pertaining to storm drainage systems.

2. Utility Compliance: Comply with regulations pertaining to storm drainage systems. Include standards of water and other utilities where appropriate.

B. Qualifications

1. Manufacturers

a. All chamber and end cap products must be produced in an ISO 9001 certified manufacturing facility or shall demonstrate at least 5 years of experience in the production of similar products.

1.09 DELIVERY, STORAGE AND HANDLING

A. Contractor shall check all materials upon delivery to assure that the proper chamber size and plastic pipe and pipe fittings have been received.

B. Contractor shall check the chambers for shipping damage prior to installation. Units that have been damaged must not be installed. Contractor shall contact chamber manufacturer immediately upon discovery of any damage. Chambers may be left palletized until the units are ready to be installed.

C. All chambers, pipe and pipe fittings shall be delivered to the site and unloaded with handling that conforms to the manufacturer's instructions for reasonable care.
D. Protect chamber and chamber fittings from dirt and damage.

E. All pipe and chambers shall be protected against impact, shock and free fall, and only equipment of sufficient capacity and proper design shall be used in the handling of the pipe. Storage of the pipe on the job shall be in accordance with the pipe manufacturer's recommendations.

F. Contractor shall refer to the fabric manufacturer's guidance handling and storage of fabric products on site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers

1. StormTech, Inc.

2. Or approved equivalent

2.02 STORMWATER CHAMBER SYSTEM

A. Chamber Options

1. Only stormwater chamber systems evaluated by a licensed design engineer and found to meet AASHTO section 12.12 safety factors are allowed.

2. Stormwater chambers must be designed in accordance with ASTM F 2418 or F 2922 Standard Specification for Polypropylene (PP) or Polyethylene (PE) Corrugated Wall Stormwater Collection Chambers

3. Stormwater chambers must be designed in accordance with ASTM F 2787 Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers

4. Chamber systems allowed under this specification include:

   a. StormTech SC-160LP
   b. StormTech SC-310
   c. StormTech SC-740
   d. StormTech DC-780
   e. StormTech MC-3500

B. Performance

1. The contractor shall submit a structural evaluation by a registered structural engineer of the manufacturer that demonstrates that the safety factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F 2418 or F 2922 must be used as part of the AASHTO structural to verify long-term performance.

2. Only mechanical and material properties that were determined in accordance with ASTM test methods shall be allowed for structural design of the chambers.

3. Only chambers affixed with the ASTM F 2418 or F 2922 designation shall be considered as meeting ASTM F 2418 or F 2922.

4. Performance of the stormwater treatment system shall be in accordance with Section 2.03 of this specification.

5. The contractor shall submit design summary by the manufacturer that demonstrates that the system is designed to convey peak flow rates without scour of foundation stone.

C. Materials

1. Chamber

   a. Chambers shall be injection molded from virgin polypropylene or polyethylene resin and be yellow in color.

   b. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels in order to provide ease of access for inspection and maintenance functions.

   c. Inspection ports shall be installed and constructed per project plans. Note that inspection ports must be installed along the Isolator™ Row and where noted on the plans to allow for inspection of the sediment build up over time.

d. The chambers shall be open-bottomed.

e. The chamber shall incorporate an overlapping corrugation joint system to allow chamber rows of almost any length to be built. Chamber models may be cut at the job site to improve site optimization and reduce product waste.

2. End Caps

a. End caps shall be injection molded or roto molded from polyethylene or polypropylene resin and allow pipe connections with polyethylene pipe. End caps shall have a curved face capable of resisting typical horizontal and vertical loads. End caps for MC-3500 and MC-4500 chambers shall be corrugated.

b. All chamber rows shall be terminated with an end cap. End cap placement on end of chamber will vary depending on chamber model.

c. End caps may incorporate cutting guides to allow easy field cutting for various diameters of pipe. Cutting guides shall be located at both the top and bottom of each end cap.

3. Manifold Piping

a. Manifold piping shall be designed to ensure that peak flows are distributed to the rows of chambers without scour of foundation stone.

b. Manifold piping shall be of dual wall HDPE piping such that accepted equations of hydraulics can be used as a basis for design.

4. Stone

a. The foundation, embedment and cover stone shall be in accordance with the chamber manufacturer's installation instructions.

5. Fabric

a. Fabric between the chamber bottom and the stone foundation located along the entire length of the Isolator Row and the first 10.5 ft (SC-310, SC-740, DC-780) or 14.5 ft (MC-3500, MC-4500) of all inlet rows. Fabric shall be AASHTO M288 Class 1 Woven for sediment capture, filtration and scour protection.

b. Fabric between the top of the Isolator Row chambers and the embedment stone and surrounding the entire chamber system shall be AASHTO M288 Class 2 Non-Woven for filtration. (not required over DC-780, MC-3500, or MC-4500 Isolator Row)

c. If required, a thermoplastic liner may be installed around the entire system to prevent water migration. See manufacturer's Tech Sheet #2 for guidance on thermoplastic liners for the system.

2.03 STORMWATER TREATMENT SYSTEMS

A. The stormwater chamber system shall incorporate an Isolator Row for stormwater treatment and system maintenance. An Isolator Row is a chamber row enclosed in geotextile fabric for sediment capture and maintenance.

B. The stormwater treatment system shall remove a minimum of 80% of Total Suspended Solids (TSS), 80% Total Petroleum Hydrocarbons (TPH), 80% Suspended Sediment Concentration, 60% Total Phosphorus, and 60% Total Zinc as verified by 3rd party testing, when requested.

C. Stormwater treatment system inspection and maintenance shall be in accordance with section 3 of this specification and the product manufacturer's published guidance.

2.04 ACCESSORIES

A. Spacers can be used to obtain the required minimum spacing between chamber rows.

B. During construction FlexStorm Catch It inlet filters or pipe plugs on all inlet pipes to the stormwater chamber system shall be used to prevent construction sediment from entering the Isolator Row and chamber storage systems. Pipe plugs to be removed once construction of the system is complete and no further construction sediment loading is expected.

PART 3 EXECUTION

3.01 PREPARATION

A. General

1. Installing contractors are required to use and understand the latest manufacturer's installation instructions prior to beginning system installation.

    a. See Section 1.06 for manufacturer preinstallation meeting information.
    b. Chamber products must be designed and installed in accordance with the manufacturer's minimum requirements. Failure to do so will void the manufacturer's limited warranty.

2. The contractor shall install all drainage structures, pipe and chambers in the locations shown on the design engineer's drawings and/or as approved by the Owner. Pipe shall be of the type and sizes specified on the drawings and shall be laid accurately to line and grade. Structures shall be accurately located and properly oriented.

3. Chambers, pipe and drainage structures shall be inspected prior to installation and any defective or damaged product shall be replaced accordingly.

4. Contact local underground utility companies prior to construction.

5. The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.

B. Site Preparation

1. Excavation must be free of standing water. Dewatering measures must be taken if required.

    a. When groundwater is present in the work area, dewater to maintain stability of in-situ and imported materials. Maintain water level below pipe bedding and foundation to provide a stable trench bottom.

2. Prepare the chamber bed's subgrade soil as outlined in the engineer's drawings. Requirement for subgrade soil bearing capacity should meet or exceed the chamber manufacturer's required allowable subgrade soil bearing capacity. The contractor must report any discrepancies with subgrade soil's bearing capacity to the design engineer.

3.02 CHAMBER INSTALLATION AND BACKFILLING

A. Install chamber system flat or at constant slope between points an elevations indicated.

B. Construct fabric and stone foundation per chamber manufacturer's installation instructions.

C. Construct the chamber bed by joining the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber onto the end corrugation of the last chamber in the row.

D. See pipe manufacturer's installation instructions for pipe assembly.

E. Stone placement between chamber rows and around perimeter must follow instructions as indicated in the most current version of the chamber manufacturer's installation instructions.

F. The contractor must refer to the chamber manufacturer's installation instructions for a table of acceptable vehicle loads at various depths of cover. The contractor is responsible for preventing vehicles that exceed the chamber manufacturer's requirements from traveling across or parking over the chamber system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.

G. Refer to the chamber manufacturer's installation instructions for minimum requirements for backfill material above the stormwater chamber system.

H. See pipe manufacturer's installation instructions for guidance on installing the plastic pipe fittings to the chamber system.

3.03 PROTECTION

A. Protect all inlets to the stormwater chamber system during construction. As noted in Section 2.05, pipe plugs in the inlet manhole pipes or FlexStorm Catch It inlet filters may be used to prevent construction sediments from clogging the system. Once construction has ceased, the pipe plugs are removed to allow normal system functionality.

B. All inlet and outlet structures should be protected against construction sediments.

3.04 INSPECTION AND MAINTENANCE

A. As noted in Section 2.02, chambers shall incorporate an optional inspection port to allow for inspection of the stormwater system during normal operations.

   1. Inspection can also be accomplished through the inlet manhole connected to the Isolator Row which may require confined space entry certification of the inspector.

B. Refer to the chamber manufacturer's Isolator Row Operation and Maintenance manual for guidance on inspection intervals during normal system operation

C. Maintenance of the Isolator Row shall utilize a JetVac process to remove sediments that have accumulated in the Isolator Row over time.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 334100 – REINFORCED CONCRETE PIPING

1.01 DESCRIPTION

A. Under this item, the Contractor shall furnish and install reinforced concrete pipe to the line and grade indicated in the contract or directed by the Architect including all required operations specified.

1.02 PROCEDURE

A. Excavated material shall be stockpiled at least two feet away from the edge of the pipe trench.

B. Where existing structures are to be connected to, they shall be exposed for inspection prior to general trench excavation. The cost of this exploratory excavation, as well as connection of pipe to existing structures, will be included in the price bid.

C. Pipe shall be laid from the low end toward the high and with bells up grade. Pipe shall be laid to the line and grade indicated on the plans or as directed by the Architect.

D. Backfill around and over the pipe shall be thoroughly compacted to a minimum of ninety-five percent (95%) maximum density of soil, as determined by the Modified Method of Test for the Compaction and Density of Soils (AASHO T-180) by means approved by the Engineer. This soil shall be compacted in layers not exceeding eight (8) inches loose thickness. Backfill and compaction around the pipe shall be done in such a manner as to not disturb the pipe alignment.

E. Pipe shall be cut off even with the inside face of manholes, catch basins, etc. The cost of this work will be included in the price bid.

1.02 MATERIALS

A. Except as otherwise noted, reinforced concrete pipe shall conform to the local governing authority's Department of Public Works specifications for Class IV Reinforced Concrete Pipe.

1.03 WIDTH OF TRENCH

A. The width of trench in which the pipe is laced shall be sufficient to permit thorough tamping of the backfill under the haunches and around the pipe.

B. Except as otherwise directed by the Architect or indicated on the drawings, the maximum width of trench shall be the outside diameter of the pipe plus three (3) feet.

1.04 PIPE AND JOINTS

A. Joints shall be formed by caulking into the hub a gasket of jute or oakum and then filled with mortar composed of one part Portland Cement and two parts fine aggregate, or, at the Contractor's option, preformed bituminous caulking compound of a type approved by the Architect may be used; except the joints need not be caulked for slip joint pipe, or for bell and spigot type if provided with approved lock joint, except that a mortar collar will be required.

END OF SECTION

DIVISION 33 – UTILITIES

SECTION 334613 – SUBSURFACE DRAINAGE SYSTEM (Foundation Walls)

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to install the subsurface drainage material as shown on the drawings and specified herein.

1.02 DESCRIPTION

A. The work under this section of the specifications shall consist of furnishing all labor, materials, equipment, and appliances necessary or required to furnish and install all work of this section as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Provide a three-dimensional drainage composite consisting of a drainage core of fused, entangled nylon filaments and a geotextile fabric bonded to one surface of the core. The composite shall function as a drainage matting designed to dissipate hydrostatic pressure from backfills abutting below-grade structures, collecting accumulated groundwater, and conveying it through a slotted, corrugated drain pipe, to a discharge system, as indicated on the contract documents and as specified herein.

1.03 QUALIFICATIONS

A. To assure unity of responsibility, the material specified in this section shall be furnished and coordinated by the manufacturer. The contractor shall assume responsibility for the satisfactory installation as specified.

1.04 PERFORMANCE REQUIREMENTS

A. The geocomposite drain shall provide a minimum flow capacity of 4.78 gpm/ft. at a hydraulic gradient of 1.0 at a normal pressure of 1,440 psf in Ottawa Sand as tested using the procedure as required in ASTM D-4716.

1.05 SUBMITTALS

A. Submit samples and product data on materials in accordance with Section 013300.

B. Any alternative materials submitted for approval shall include complete design and hydraulic date, including test evidence of compliance to the essential design parameters of the project and reference installations similar in size and scope to that specified for the project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in manufacturer's or distributor's packing, undamaged and complete with installation instructions.

B. Store off ground, under cover, protected from ultra-violet radiation, weather, and construction activities.

PART 2 - PRODUCTS

2.01 GEOCOMPOSITE DRAIN

A. The geocomposite drain shall conform to the following nominal dimensions, weights, and roll values:

1. Nominal dimensions and weights:

Core width (in):	39/78
Roll length (ft):	100
Gross diameter (in):	24
Gross roll weight (lbs.):	38/76
Area/roll (yds^2):	36
Thickness (in):	0.4
Total weight (oz/yd^2):	15.2
Core weight (oz/yd^2):	10.9
Core polymer:	Nylon black plus carbon black

Notation: Fabric bond retained with a 180° inside bend. Longitudinal edge has 3-in. fabric overlap.

2. Geotextile Fabric Properties

	Procedure	Typical Values
Weight (oz/yd2):	ASTM D-3776	4.3
AOS (US Series, sieve #):	ASTM D-4751	70-120
Flow rate (gpm/ft2):	ASTM D-4491	160
Permitivity (sec2):	ASTM D-4491	2.17
Grab strength (lb.):	ASTM D-4632	130
Trapezoidal tear (lb.):	ASTM D-4533	50
Puncture (lb.):	ASTM D-4833	55

3. Exposure (for 80% strength retention) all products:

Temperature range:	-100°F to 250°F
pH range:	3 -12
Fuel submersion:	Stable

2.02 FOOTING DRAIN PIPING

A. Drain piping shall be 4" single wall slotted HDPE corrugated gravity drain piping, ASTM F 405 C.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before beginning installation, the Contractor shall inspect and approve the subsurface installation to insure that the construction is acceptable for the subsurface drain installation and that the perimeter subgrade has been excavated to within ±0.5 feet of design elevation. The Contractor shall report unsatisfactory conditions in writing prior to start of work and shall not proceed until all unsatisfactory conditions have been remedied to the satisfaction of the Architect. By beginning installation, the Contractor signifies his approval of the preceding work.

3.02 INSTALLATION

A. The geocomposite drain shall be installed in vertical strips cut to length, as required, so that the drain is in contact with the walls and footers and drapes over the footer drain pipe. For each strip, the top 5 inches of the core shall be separated for the filter fabric and cut off. The geocomposite drain shall be glued with an approved glue to the subsurface construction with a bead of glue applied to the 5 inches of exposed fabric at the top of each strip with the core against the subsurface construction. The geocomposite drain shall be cut to fit, as required, around wall penetrations such as underground utilities and wrapped tightly around corners in the foundation. At joints between strips, the 3-inch fabric overlap shall be glued continuously to the previously installed strip with an approved glue. Soil or other approved material shall be placed on the bottom of each strip to temporarily hold the geocomposite drain in place against the structure and over the drain pipe until hall work begins. The glue for the seams shall be 3M Fast Bond, Goodyear Pilobond, or approved equal.

3.03 QUALITY ASSURANCE

A. The subsurface drain material shall not be defective, plugged, or otherwise damaged in any way. Any and all such problems shall be corrected by the Contractor at no extra cost to the Owner and to the satisfaction of the Architect.

3.04 CLEAN UP

A. At the completion of the scope of work, the Contractor shall remove from the job site and properly dispose of all remaining debris, waste materials, excess materials, and equipment required of or created by the Contractor. Disposal of waste materials shall be solely the responsibility of the Contractor and be done in accordance with applicable waste disposal regulations.

END OF SECTION