PROJECT MANUAL

FOR:

Phase 3 Bond Improvements

at

Middle School – High School and Ridge Street Elementary

BLIND BROOK – RYE SCHOOL DISTRICT
TOWN of PORT CHESTER, WESTCHESTER COUNTY

BBS

ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

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NEW YORK STATE EDUCATION DEPARTMENT NUMBER:

S.E.D. No. 66-19-05-02-0-002-022
66-19-05-02-0-001-018

B.B.S. PROJECT NUMBER:

25-142a - b

SED SUBMISSION DATE:

August 2025

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.

Lawrence Salvesen, A.I.A. Lic. No. 020623

LICENSED PROFESSIONAL ENGINEER
FREDERICK W. SEEDA
No. 068018
STATE OF NEW YORK

EXP. 3-31-28

REGISTERED ARCHITECT
LAWRENCE SALVESEN
020623
STATE OF NEW YORK

EXP. 10-31-26

TABLE OF CONTENTS

DIVISION 00 – FRONT END DOCUMENTS

Section 000101 – Cover Page
Section 000110 – Table of Contents
Section 000200 – Project Directory
Section 001116 – Invitation to Bidders
Section 002113 – Instruction to Bidders
Section 003100 – Information Available to Bidders
Section 004100 – Bid Proposal Form
Section 004200 – Proposed Equivalent Form
Section 004300 – Proposed Substitution Form
Section 004400 – Certification of Compliance with the Iran Divestment Act
Section 004410 – Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act
Section 004420 – Iran Divestment ACT Compliance Rider
Section 004500 – Statement of Bidder's Qualifications
Section 004600 – Sexual Harassment Prevention Certification
Section 004700 – Labor Law Section 220-i Compliance Certification
Section 005000 – Standard Form of Agreement – A.I.A. Document A132 and Rider
Section 005100 – General Conditions of Contract – A.I.A. Document A232
Section 005200 – Supplementary Conditions and Second Supplementary Conditions
Section 006100 – Payment & Performance Bond Forms – A.I.A. Document A312
Section 006200 – Requisition Form – A.I.A. Documents G732 and G703
Section 006300 – Insurance Forms – Accord Form Sample, Additional Insured Endorsements & Affidavit
Section 006400 – Closeout Documents – A.I.A. Documents G705, G706, G706A, G707, G707A
Section 007000 – Prevailing Wage Rates

DIVISION 01 – GENERAL REQUIREMENTS

Section 010000 – General Requirements
Section 010100 – Conditions of This Contract
Section 010200 – Insurance Requirements
Section 010300 – Governing Laws
Section 012100 – Allowances
Section 012300 – Alternates
Section 012600 – Construction Phase Clarifications
Section 012600.1 – Request For Information Form
Section 013000 – Special Procedures and Provisions
Section 013000.1 – Record of Unacceptable and Non-Conforming Work Document
Section 013200 – Project Schedule
Section 013300 – Submittal Procedures
Section 013300.1 – Submittal Cover Sheet
Section 013500 – Commissioner Regulations (Part 155.5) and Safety Standards
Section 014213 – Abbreviations and Symbols
Section 014219 – Applicable Standards
Section 014523 – Tests, Inspections, and Special Inspections
Section 014529 – Testing Laboratory Service
Section 015000 – Temporary Facilities, Controls & Miscellaneous Requirements
Section 016000 – Product Requirements
Section 017000 – Contract Closeout
Section 017423 – Final Cleaning
Section 017839 – Project Record Documents

DIVISION 02 – EXISTING CONDITIONS

Section 024119 – Selective Demolition
Section 028000 – Asbestos Work Under This Contract
Section 028100 – Asbestos Handling Certificate
Section 028218 – Abatement of Asbestos Flooring/Mastic - Scrape Method
Section 029000 – Lead Containing Materials Abatement

DIVISION 03 – CONCRETE

Section 035416 – Self Leveling Cementitious Underlayment

DIVISION 04 – MASONRY

Section 042000 – Unit Masonry
Section 042150 – Thin Brick Masonry

DIVISION 05 – METALS

Section 054000 – Cold Formed Metal Framing
Section 055000 – Metal Fabrications

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

Section 061000 – Rough Carpentry
Section 062000 – Finish Carpentry

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

Section 072600 – Vapor Retarders
Section 072713 – Self-Adhered Non-Permeable Air Barrier Membrane
Section 074293 – Metal Fascia and Soffit Panels
Section 076000 – Flashing and Sheet Metal
Section 078413 – Penetration Firestopping
Section 078443 – Joint Firestopping
Section 079200 – Joint Sealants

DIVISION 08 – OPENINGS

Section 081113 – Hollow Metal Doors and Frames
Section 081416 – Flush Wood Doors
Section 084123 – Fire Rated Aluminum Entrances and Storefronts
Section 086300 – Metal Framed Skylights
Section 087100 – Door Hardware
Section 088000 – Glazing
Section 088813 – Fire Rated Glazing

DIVISION 09 – FINISHES

Section 092900 – Gypsum Wall Board
Section 093013 – Porcelain and Glazed Ceramic Tile
Section 095000 – Acoustical Ceiling Systems
Section 096519 – Resilient Tile Flooring
Section 096800 – Carpeting
Section 099000 – Painting

DIVISION 10 – SPECIALTIES

Section 101100 – Visual Display Units
Section 101400 – Signage
Section 102119 – Plastic Toilet Compartments
Section 102226 – Operable Partitions
Section 102813 – Toilet Accessories
Section 104400 – Fire Extinguishers, Cabinets and Accessories

DIVISION 11 – EQUIPMENT

Section 116100 – Stage Rigging and Drapery
Section 116143 – Fire Safety Curtain and Rigging

DIVISION 12 – FURNISHINGS

Section 122400 – Manual Operated Roller Shades
Section 123216 – Manufactured Plastic-Laminate-Clad Casework

DIVISION 13 – SPECIAL CONSTRUCTION

(Not Applicable)

DIVISION 14 – CONVEYING EQUIPMENT

Section 142200 – Hydraulic Elevator (Schindler)

DIVISION 21 – FIRE SUPPRESSION

(Not Applicable)

DIVISION 22 – PLUMBING

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 221364 – Acid Waste Piping Systems
Section 224000 – Plumbing Fixtures and Trim
Section 226310 – Natural Gas Piping

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 230516 – Expansion Compensation
Section 230519 – Meters and Gauges 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 232113 – Hydronic Piping
Section 232116 – Hydronic Piping Specialties
Section 232300 – Refrigeration Piping Systems
Section 233000 – Air Distribution
Section 233101 – Duct Cleaning
Section 233113 – Ductwork
Section 233300 – Duct Accessories
Section 233400 – Fans
Section 233600 – Air Terminal Units
Section 233713 – Diffusers, Registers and Grilles
Section 236000 – Compressed Air Piping
Section 238126 – Single Zone Heat Pump

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 260553 – Identification for Electrical Systems
Section 262300 – Low Voltage Switchgear
Section 262726 – Wiring Devices
Section 262816 – Heavy Duty Safety Switches
Section 265100 – Interior Lighting

DIVISION 27 – COMMUNICATIONS

Section 271501 – Communications and Horizontal Cabling

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Section 284613.10 – Fire Alarm System (Modify Existing)

DIVISION 31 – EARTHWORK

(Not Applicable)

DIVISION 32 – EXTERIOR IMPROVEMENTS

(Not Applicable)

DIVISION 33 – UTILITIES

(Not Applicable)

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:	Xxxxx Xxxxxx (xxx) xxx-xxxx (xxx) xxx-xxxx Fax
Assistant Superintendent for Business:	Xxxxx Xxxxxx (xxx) xxx-xxxx (xxx) xxx-xxxx Fax
Director of School Facilities and Operations:	Xxxxx Xxxxxx (xxx) xxx-xxxx (xxx) xxx-xxxx Fax
District Counsel:	Guercio & Guercio, LLP 77 Conklin Street Farmingdale, NY 11735 (516) 694-3000 (516) 694-4738 Fax
Construction Manager:	Xxxxx Xxxxxx (xxx) xxx-xxxx (xxx) xxx-xxxx Fax xxxxxxx@xxxxxxxx.xxx

Invitation to Bidders

BOARD OF EDUCATION
Blind Brook-Rye Union Free School District

PUBLIC NOTICE: is hereby given for separate contract sealed bids for: **Phase 3 Bond Improvements at the BBR HSMS & Ridge Street Elementary School.** Bids will be received by the School District, on **January 15, 2025** at **11:00 a.m.** in the **District Administration Office, at 390 North Ridge Street, Rye Brook, New York, 10573**, and at said time and place publicly opened and read aloud.

Beginning **Monday, December 15, 2025,** 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 Blind Brook-Rye 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 can be scheduled by contacting the District. Refer to the Project Directory for contact information.

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
Blind Brook-Rye Union Free School District

Dated: **December 15, 2025**

INSTRUCTIONS TO BIDDERS

CONTENTS

1. Documents (Issuance and Restrictions)
2. Qualification of Bidders
3. Compliance with Applicable Laws and Regulations
4. Single Prime Contracts
5. Examination of Documents and Site
6. Ambiguities, Interpretations, and Addenda
7. Pre-Bid Conference
8. Basis of Bid – Performance and Quality Standards
9. Preparation, Identification, and Submission of Proposal
10. Bid Security
11. Receipt and Opening of Bids
12. Modification or Withdrawal of Proposal
13. Disqualifications of Proposal
14. Award of Contract
15. Execution of Contract
16. Taxes and Permits
17. Sub-Contractors Listing
18. Time of Completion
19. Condition of Work Operations

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 Bidder is not currently involved in bankruptcy proceedings.

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

K. 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.

L. 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

M. 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 in Items A through L 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, clarifications, or corrections will be made in the form of addenda forwarded to each bidder at the address furnished by each bidder and receipt acknowledged on the form of proposal.

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 respond to questions regarding the bid documents.

B. Addenda clarifying 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 **March 2, 2026,** and complete within the number of calendar days specified in the Form of Proposal. Project must be completed by **August 28. 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

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. Pre-Construction Survey, Bulk Sampling and Analysis of Suspect Asbestos Containing Materials – Prepared by JC Broderick & Associates, Inc. 1775 Expressway Drive North – Suite 1, Hauppauge NY 11788 631-584-5492. Document follows this section.

B. Pre-Construction Lead Materials Inspection and Sampling – Prepared by JC Broderick & Associates, Inc. 1775 Expressway Drive North – Suite 1, Hauppauge NY 11788631-584-5492. Document follows this section.

C. Pre-Construction PCB Inspection and Sampling – Prepared by JC Broderick & Associates, Inc. 1775 Expressway Drive North – Suite 1, Hauppauge NY 11788 631-584-5492. Document follows this section.

END OF SECTION

SCHOOL DISTRICT NAME **BID PROPOSAL FORM**

PROJECT NAME at 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 **Xxxxxxxxxxxx School District,** Town of **Xxxxxxxxxxxxx, 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:

PROJECT NAME at 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 School Name, 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 School Name, 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 School Name, 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 School Name, 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, Xxxxxxxxxxxxxxxxxxxxxxxx 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

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™ – 2009

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)

BBS Architects, Landscape Architects and Engineers P.C.
244E Main Street
Patchogue, New York 11772

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™–2009, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2009, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2009, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

AIA Document A232™–2009 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

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

10 INSURANCE AND BONDS

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 SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement, if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages, mechanics' liens and other security interests, the Owner's time requirement shall be as follows:

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

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Portion of the Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

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 without a Guaranteed Maximum Price, 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. Based on the selection above, also complete either Section 5.1.4, 5.1.5 or 5.1.6 below.)

§ 4.2 Stipulated Sum

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

§ 4.2.2 The Stipulated Sum is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.2.4 Allowances included in the Stipulated Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Allowance

§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price

§ 4.3.1 The Contract Sum is the Cost of the Work as defined in Exhibit A, Determination of the Cost of the Work, plus the Contractor's Fee.

§ 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.)

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§ 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 rate paid at the place of the Project.

§ 4.3.6 Unit prices, if any:
(Identify and state the unit price; state 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 for the Owner, in writing, a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the items in Section A.1 of Exhibit A, 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 Contract Sum is the Cost of the Work as defined in Exhibit A, Determination of the Cost of the Work, plus the Contractor's Fee.

§ 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:

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

§ 4.4.6 Unit Prices, if any:
(Identify and state the unit price, and state the 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 sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed ($), subject to additions and deductions by changes in the Work as provided in the Contract Documents. Such 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.
(Insert specific provisions if the Contractor is to participate in any savings.)

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§ 4.4.7.2 The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

§ 4.4.7.3 Allowances included in the Guaranteed Maximum Price, if any:
(Identify and state the amounts of any allowances, and state whether they include labor, materials, or both.)

Item	Allowance

§ 4.4.7.4 Assumptions, if any, on which the Guaranteed Maximum Price is based:

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and upon certification of the Project Application and Project Certificate for Payment or Application for Payment and Certificate for Payment by the Construction Manager and Architect and issuance by the 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 certified amount in the Application for Payment 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 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 and be prepared in such form and supported by such data to substantiate its accuracy as the Construction Manager and Architect may require. 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.

§ 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 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of percent (%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute may be included as provided in Section 7.3.9 of the General Conditions;

.2 Add 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), less retainage of percent (%);

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

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.4 Subtract amounts, if any, for which the Construction Manager or Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of the General Conditions.

§ 5.1.4.4 The progress payment amount determined in accordance with Section 5.1.4.3 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to percent (%) of the Contract Sum, less such amounts as the Construction Manager recommends and the Architect determines for incomplete Work and unsettled claims; and

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of the General Conditions.

§ 5.1.4.5 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.4.3.1 and 5.1.4.3.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 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 A, 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 cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed (1) progress payments already received by the Contractor; less (2) that portion of those payments attributable to the Contractor's Fee; plus (3) payrolls for the period covered by the present Application for Payment.

§ 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 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take the Cost of the Work as described in Exhibit A, Determination of the Cost of the Work;

.2 Add the Contractor's Fee, less retainage of percent (%). The Contractor's Fee shall be computed upon the Cost of the Work described in that Section at the rate stated in that Section; or if the Contractor's Fee is stated as a fixed sum, an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.3 Subtract retainage of percent (%) from that portion of the Work that the Contractor self-performs;

.4 Subtract the aggregate of previous payments made by the Owner;

.5 Subtract the shortfall, if any, indicated by the Contractor in the documentation required by Article 5 or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Subtract amounts, if any, for which the Construction Manager or Architect has withheld or withdrawn a Certificate for Payment as provided in Section 9.5 of AIA Document A232™–2009, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition.

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon (1) a mutually acceptable procedure for review and approval of payments to Subcontractors and (2) 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 shall not be deemed to represent that 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; that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used

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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.

§ 5.1.6 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 or Architect to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed (1) progress payments already received by the Contractor; less (2) that portion of those payments attributable to the Contractor's Fee; plus (3) payrolls for the period covered by the present Application for Payment.

§ 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 Contract Sum among the various portions of the Work and be prepared in such form and supported by such data to substantiate its accuracy as the Construction Manager and Architect may require. 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.

§ 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 for which the Contractor has made or intends to make actual 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 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take 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 schedule of values. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.10 of AIA Document A232–2009;

.2 Add 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 Work, or if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing;

.3 Add the Contractor's Fee, less retainage of percent (%). The Contractor's Fee shall be computed upon the Cost of the Work at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, shall be an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.4 Subtract retainage of percent (%) from that portion of the Work that the Contractor self-performs;

.5 Subtract the aggregate of previous payments made by the Owner;

.6 Subtract 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

.7 Subtract amounts, if any, for which the Construction Manager or Architect have withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A232–2009.

§ 5.1.6.5 The Owner and the Contractor shall agree upon a (1) mutually acceptable procedure for review and approval of payments to Subcontractors and (2) 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 shall not be deemed to represent that 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; that the

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Construction Manager or Architect have made exhaustive or continuous on-site inspections; or 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.

§ 5.2 Final Payment

§ 5.2.1 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 Section 12.2 of AIA Document A232–2009, 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 A, Determination of the Cost of the Work when payment is on the basis of the Cost of the Work, with or without a Guaranteed Maximum payment; and

.3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner not more than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A232–2009, 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 Section 15.3 of AIA Document A232–2009, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, 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.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A232–2009.

[ ] Litigation in a court of competent jurisdiction.

[ ] Other: *(Specify)*

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 A232–2009.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2009.

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

§ 7.2.1 Subject to the provisions of Section 7.2.2 below, the Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2009.

§ 7.2.2 The Contract may be terminated by the Owner for cause as provided in Article 14 of AIA Document A232–2009; however, the Owner shall then only pay the Contractor an amount calculated 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 Sections 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum, 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; and

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

§ 7.2.3 If the Owner terminates the Contract for cause when the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, and as provided in Article 14 of AIA Document A232–2009, the amount, if any, to be paid to the Contractor under Section 14.2.4 of AIA Document A232–2009 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.2.

§ 7.2.4 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. 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.

§ 7.2.5 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2009; in such case, the Contract Sum and Contract Time shall be increased as provided in Section 14.3.2 of AIA Document A232–2009, except that the term 'profit' shall be understood to mean the Contractor's Fee as described in Sections 4.3.2 and 4.4.2 of this Agreement.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2009 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 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.)*

%

§ 8.3 The Owner's representative:
(Name, address and other information)

§ 8.4 The Contractor's representative:
(Name, address and other information)

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

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A132–2009, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition.

§ 9.1.2 The General Conditions are, AIA Document A232–2009, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents are:

.1 AIA Document A132™–2009, Exhibit A, Determination of the Cost of the Work, if applicable.

.2 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed, or the following:

.3 AIA Document E202™–2008, Building Information Modeling Protocol Exhibit, if completed, or the following:

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.4 Other documents, if any, listed below:
(List here any additional documents which are intended to form part of the Contract Documents. AIA Document A232–2009 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A232–2009.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A232–2009.)

Type of Insurance or Bond	Limit of Liability or Bond Amount ($0.00)

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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Rider to AIA Document A132 – 2009
Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

The Contractor represents and warrants the following to the Owner (in addition to any other representations and warranties contained in the Contract Documents) as an inducement to the Owner to execute this Agreement, which shall survive any termination of this Agreement and the final completion of the work:

1. Contractor and Subcontractors are financially solvent, able to pay all debts as they mature and are possessed of sufficient working capital to complete the Work and perform all obligations hereunder;

2. Contractor is able to furnish all labor, materials, plant, tools, suppliers, equipment required to complete the Work and perform its obligations hereunder;

3. Contractor is authorized to do business in the State of New York and the United States and is properly licensed by all governmental, public, and quasi public authorities having jurisdiction over it and over the Work and the Project;

4. Contractor's execution of this Agreement and its performance thereof, is within its duly authorized powers;

5. Contractor's duly authorized representative has visited the site of the Project, is familiar with the local and special conditions under which the Work is to be performed and has correlated on-site observation with the requirements of the Contract Documents;

6. Contractor possesses a high level of experience and expertise in the business administration, construction management, construction rules and regulations on school property, and the superintendence of Projects of the size, complexity and nature of the particular Project, and that it will perform the Work with the care and diligence of such a Contractor.

The foregoing warranties are in addition to, and not in lieu of, any and all other liability imposed upon the Contractor's duties, obligations, and performance hereunder. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment of the Work. All representations and warranties set forth in this Agreement, including this paragraph, shall survive the final completion of the Work or the earlier termination of this Agreement. The Contractor realizes that the Owner is relying upon the Contractor's skill and experience in connection with the Work called for hereunder.

AIA® Document A232™ – 2009

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™–2009, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2009, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2009, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT AND CONSTRUCTION MANAGER

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY OTHER CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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INDEX
(Topics and numbers in bold are section headings.)

Acceptance of Nonconforming Work
9.6.6, 9.9.3, **12.3**
Acceptance of Work
9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3
Access to Work
3.16, 6.2.1, 12.1
Accident Prevention
10
Acts and Omissions
3.2.1, 3.2.2, 3.3.2, 3.12.8, 3.18, 8.3.1, 9.5.1, 10.1, 10.2.5, 13.4.2, 13.7
Addenda
1.1.1, 3.11, 4.2.14
Additional Costs, Claims for
3.2.4, 3.7.4, 3.7.5, 6.1.1, 7.3, 9.10.3, 9.10.4, 10.3, 10.4, 15.1.4
Additional Inspections and Testing
4.2.8, 12.2.1, 13.5
Additional Insured
11.1.4
Additional Time, Claims for
3.7.4, 3.7.5, 6.1.1, 7.3, 8.3, 10.3
Administration of the Contract
3.10, **4.2**
Advertisement or Invitation to Bid
1.1.1
Aesthetic Effect
4.2.19
Allowances
3.8, 7.3.8
All-risk Insurance
11.3.1, 11.3.1.1
Applications for Payment
4.2.7, 4.2.15, 7.3.9, 9.2, **9.3,** 9.4, 9.5.1, 9.7, 9.8.3, 9.10.1, 9.10.3, 9.10.5, 11.1.3, 14.2.4
Approvals
2.1.1, 2.2.2, 2.4, 3.1.4, 3.10.1, 3.10.2, 3.12.4 through 3.12.10, 3.13.2, 3.15.2, 4.2.9, 9.3.2, 13.4.2, 13.5
Arbitration
8.3.1, 11.3.10, 13.1, 15.3.2, **15.4**
ARCHITECT
4
Architect, Certificates for Payment
9.4
Architect, Definition of
4.1.1
Architect, Extent of Authority
5.2, 7.1.2, 7.3.7, 7.4, 9.3.1, 9.4, 9.5, 9.8.3, 9.8.4, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 15.1.3, 15.2.1
Architect, Limitations of Authority and Responsibility
2.1.1, 3.12.8, 4.2.1, 4.2.2, 4.2.8, 4.2.13, 5.2.1, 9.6.4, 15.2
Architect's Additional Services and Expenses
2.4, 11.3.1.1, 12.2.1, 12.2.4, 13.5.2
Architect's Administration of the Contract
4.2, 9.4, 9.5, 15.2
Architect's Approvals
3.12.8
Architect's Authority to Reject Work
4.2.8, 12.1.2, 12.2.1
Architect's Copyright
1.5
Architect's Decisions
4.2.8, 7.3.9, 7.4, 8.1.3, 8.3.1, 9.2, 9.4, 9.5, 9.8.3, 9.9.2, 13.5.2, 14.2.2, 14.2.4, 15.2
Architect's Inspections
3.7.4, 4.2, 9.8.3, 9.9.2, 9.10.1, 13.5
Architect's Instructions
3.2.4, 7.4, 9.4
Architect's Interpretations
4.2.8, 4.2.17, 4.2.18
Architect's On-Site Observations
4.2.2, 9.4, 9.5.1, 9.10.1, 12.1.1, 12.1.2, 13.5
Architect's Project Representative
4.2.16
Architect's Relationship with Contractor
1.1.2, 1.5, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.9.2, 3.9.3, 3.10, 3.11, 3.12.8, 3.16, 3.18, 4.2, 5.2, 6.2.2, 8.2, 11.3.7, 12.1, 13.5
Architect's Relationship with Construction Manager
1.1.2, 9.3 through 9.10, 10.3, 13.5.1, 10.3, 11.3.7, 13.4.2, 13.5.4
Architect's Relationship with Subcontractors
1.1.2, 4.2.8, 5.3, 9.6.3, 9.6.4
Architect's Representations
9.4, 9.5, 9.10.1
Architect's Site Visits
4.2.2, 9.4, 9.5.1, 9.8.3, 9.9.2, 9.10.1, 13.5
Asbestos
10.3.1
Attorneys' Fees
3.18.1, 9.10.2, 10.3.3
Award of Other Contracts
6.1.1, 6.1.2
Award of Subcontracts and Other Contracts for Portions of the Work
5.2
Basic Definitions
1.1
Bidding Requirements
1.1.1, 5.2.1, 11.4.1

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Binding Dispute Resolution
9.7, 11.3.9, 11.3.10, 13.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.4.1
Boiler and Machinery Insurance
11.3.2
BONDS, INSURANCE AND
11
Bonds, Lien
7.3.7.4, 9.10.3
Bonds, Performance and Payment
7.3.7.4, 9.6.7, 9.10.3, 11.3.9, 11.4
Building Permit
2.2.2, 3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5
Certificates for Payment
4.2.2, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 15.1.3
Certificates of Inspection, Testing or Approval
13.5.4
Certificates of Insurance
9.3.2, 9.10.2, 11.1.3
Change Orders
1.1.1, 2.4, 3.4.2, 3.7.4, 3.8.2, 3.11, 3.12.8, 4.2.12, 4.2.13, 4.2.14, 5.2.3, 7.1.1, 7.1.2, **7.2**, 7.3.2, 7.3.4, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3
Change Orders, Definition of
7.2
Changes
7.1
CHANGES IN THE WORK
2.2.1, 3.4.2, 3.11, 3.12.8, 4.2.13, 4.2.14, **7**, 8.3.1, 9.3.1.1
Claims, Definition of
15.1.1
CLAIMS AND DISPUTES
1.1.8, 3.2.4, 3.7.5, 6.1.1, 7.3.9, 8.3.2, 9.3.3, 9.10.3, 9.10.4, 10.3.3, **15**, 15.4
Claims for Additional Cost
3.2.4, 3.7.5, 6.1.1, 7.3.9, 9.10.3, 9.10.4, 10.3.2, 10.4, **15.1.4**
Claims for Additional Time
3.2.4, 3.7.5, 7, 8.3.2, 10.4, **15.1.5**
Concealed or Unknown Conditions, Claims for
3.7
Claims for Damages
3.2.4, 3.18, 6.1.1, 6.2.5, 8.3.2, 9.3.3, 9.5.1.2, 9.10.2, 9.10.5, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 15.1.6
Cleaning Up
3.15, 6.3
Commencement of Statutory Limitation Period
13.7
Commencement of the Work, Definition of
8.1.2
Communications, Owner to Architect
2.2.6
Communications, Owner to Construction Manager
2.2.6
Communications, Owner to Contractor
2.2.6
Communications Facilitating Contract Administration
3.9.1, **4.2.6**
COMPLETION, PAYMENTS AND
9
Completion, Substantial
4.2.15, 8.1.1, 8.1.3, 8.2.3, 9.4.3.3, **9.8**, 9.9.1, 9.10.3, 12.2.1, 12.2.2, 13.7
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1
Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY OTHER CONTRACTORS
1.1.4, **6**
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.12.8, 4.2.12, 4.2.13, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1
Construction Manager, Building Permits
2.2.2
Construction Manager, Communications through
4.2.6
Construction Manager, Construction Schedule
3.10.1, 3.10.3
CONSTRUCTION MANAGER
4
Construction Manager, Definition of
4.1.2
Construction Manager, Documents and Samples at the Site
3.11
Construction Manager, Extent of Authority
3.12.7, 3.12.8, 4.1.3, 4.2.1, 4.2.4, 4.2.5, 4.2.9, 7.1.2, 7.2, 7.3.1, 8.3, 9.3.1, 9.4.1, 9.4.2, 9.4.3, 9.8.2, 9.8.3, 9.8.4, 9.9.1, 12.1, 12.2.1, 14.2.2, 14.2.4
Construction Manager, Limitations of Authority and Responsibility
4.2.5, 4.2.8, 13.4.2
Construction Manager, Submittals
4.2.9
Construction Manager's Additional Services and Expenses
12.2.1
Construction Manager's Administration of the Contract
4.2, 9.4, 9.5

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Construction Manager's Approval
2.4, 3.10.1, 3.10.2
Construction Manager's Authority to Reject Work
4.2.8, 12.2.1
Construction Manager's Decisions
7.3.7, 7.3.9, 9.4.1, 9.5.1
Construction Manager's Inspections
4.2.8, 9.8.3, 9.9.2
Construction Manager's On-Site Observations
9.5.1
Construction Manager's Relationship with Architect
1.1.2, 4.2.1, 4.2.7, 4.2.8, 4.2.9, 4.2.13, 4.2.15, 4.2.16, 4.2.20, 9.2.1, 9.4.2, 9.5, 9.6.1, 9.6.3, 9.8.2, 9.8.3, 9.8.4, 9.9.1, 9.10.1, 9.10.2, 9.10.3, 11.1.3, 12.2.4, 13.5.1, 13.5.2, 13.5.4, 14.2.2, 14.2.4
Construction Manager's Relationship with Contractor
3.2.2, 3.2.3, 3.3.1, 3.5, 3.10.1, 3.10.2, 3.10.3, 3.11, 3.12.5, 3.12.6, 3.12.7, 3.12.8, 3.12.9, 3.12.10, 3.13.2, 3.14.2, 3.15.2, 3.16, 3.17, 3.18.1, 4.2.4, 4.2.5, 4.2.6, 4.2.9, 4.2.14, 4.2.17, 4.2.20, 5.2, 6.2.1, 6.2.2, 7.1.2, 7.2, 7.3.5, 7.3.7, 7.3.10, 8.3.1, 9.2, 9.3.1, 9.4.1, 9.4.2, 9.7, 9.8.2, 9.8.3, 9.8.4, 9.9.1, 9.10.1, 9.10.2, 9.10.3, 10.1, 10.3, 11.3.7, 12.1, 13.5.1, 13.5.2, 13.5.3, 13.5.4
Construction Manager's Relationship with Owner
2.2.2, 4.2.1, 10.3.2
Construction Manager's Relationship with Other Contractors and Owner's Own Forces
4.2.4
Construction Manager's Relationship with Subcontractors
4.2.8, 5.3, 9.6.3, 9.6.4
Construction Manager's Site Visits
9.5.1
Construction Schedules, Contractor's
3.10, 3.12.1, 3.12.2, 6.1.2, 15.1.5.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.3
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR SUSPENSION OF THE
5.4.1.1, 11.3.9, **14**
Contract Administration
3.1.3, 4.2, 9.4, 9.5
Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.2.5, 5.3
Contract Documents, Definition of
1.1.1
Contract Performance During Arbitration
15.1.3
Contract Sum
3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.2, 7.3, 7.4, **9.1,** 9.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1.1, 12.3, 14.2.4, 14.3.2, 15.1.4, 15.2.5
Contract Time
3.7.4, 3.7.5, 4, 3.10.2, 5.2.3, 7.2.3, 7.3.1, 7.3.5, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5
Contract Time, Definition of
8.1.1
CONTRACTOR
3
Contractor, Definition of
3.1.1
Contractor's Construction Schedules
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contractor's Employees
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Other Contractors and Owner's Own Forces
3.12.5, 3.14.2, 4.2.6, 6, 11.3, 12.1.2, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 3.3.2, 3.18, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8, 14.2.1.2
Contractor's Relationship with the Architect
1.1.2, 1.5, 3.2.2, 3.2.3, 3.2.4, 3.4.2, 3.5, 3.7.4, 3.10.1, 3.11, 3.12, 3.16, 3.18, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1
Contractor's Relationship with the Construction Manager
1.1.2, 3.2.2, 3.2.3, 3.3.1, 3.5, 3.10.1, 3.10.2, 3.10.3, 3.11, 3.12.5, 3.12.7, 3.12.9, 3.12.10, 3.13.2, 3.14.2, 3.15.1, 3.16, 3.17, 3.18.1, 4.2.4, 4.2.5, 5.2, 6.2.1, 6.2.2, 7.1.2, 7.3.5, 7.3.7, 7.3.10, 8.3.1, 9.2, 9.3.1, 9.4.1, 9.4.2, 9.8.2, 9.9.1, 9.10.1, 9.10.2, 9.10.3, 10.1, 10.2.6, 10.3, 11.3.7, 12.1, 13.5.1, 13.5.2, 13.5.3, 13.5.4
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
9.7
Contractor's Right to Terminate the Contract
14.1
Contractor's Submittals
3.10.2, 3.11, 3.12, 4.2.9, 9.2, 9.3, 9.8.2, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2
Contractor's Superintendent
3.9, 10.2.6

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Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 4.2.5, 4.2.7, 6.1, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3
Contractual Liability Insurance
11.1.1.8, 11.2, 11.3.1.5
Coordination and Correlation
1.2, 3.2, 3.3.1, 3.10, 3.12.6, 6.1.2, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.2.5, 3.11
Copyrights
1.5, 3.17
Correction of Work
2.3, 2.4, 9.4.1, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**
Correlation and Intent of the Contract Documents
1.2
Costs
2.4, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.6, 7.3.7, 7.3.8, 7.3.9, 11.3.1.2, 11.3.1.3, 11.3.4, 11.3.9, 12.1, 12.2.1, 13.5, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Other Contractors
3.14.2, 6.2.4, 9.5.1.5, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 11.3.1, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.2, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.2.4, 15.1.6
Damages for Delay
6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 15.1.5
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.7, 4.2.8, 4.2.10, 4.2.11, 4.2.13, 4.2.15, 4.2.16, 4.2.17, 4.2.18, 4.2.19, 4.2.20, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5, 9.8.3, 9.8.4, 9.9.1, 10.1.2, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions of the Construction Manager
7.3.7, 7.3.8, 7.3.9, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5,** 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.3, 2.4, 3.5, 4.2.8, 6.2.5, 9.5.1, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1, 12.2.2
Definitions
1.1, 2.1.1, 3.1.1, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 4.1.2, 7.2, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1
Delays and Extensions of Time
3.2, 3.7.4, 5.2.3, 7.2, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5
Disputes
7.3.8, 7.3.9, 9.3, 15.1, 15.2
DISPUTES, CLAIMS AND
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, **15**, 15.4
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Ownership and Use
1.1.1, **1.5,** 2.2.5, 3.11, 5.3
Duty to Review Contract Documents and Field Conditions
3.2
Effective Date of Insurance
8.2.2, 11.1.2
Emergencies
10.4, 14.1.1.2, 15.1.4
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.1, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Equipment, Labor, Materials and or
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12.2, 3.12.3, 3.13.1, 3.15.1, 4.2.8, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.3, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.5, 15.2.5
Failure of Payment
9.5.1.3, **9.7**, 13.6, 14.1.1.3, 14.1.3, 14.2.1.2, 15.1.4
Faulty Work (See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.15, 9.8.2, **9.10**, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3, 15.2.1
Financial Arrangements, Owner's
2.2.1
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty and Warranties)
Hazardous Materials
10.2.4, **10.3**
Identification of Contract Documents
1.2.1
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7

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Information and Services Required of the Owner
2.1.2, **2.2**, 4.2.6, 6.1.2, 6.2.5, 9.6.1, 9.6.4, 9.8, 9.9.1, 9.10.3, 10.3.2, 10.3.3, 11.2, 11.3.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.3, 15.1.2
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Extent of Authority
14.2.2, 14.2.4, 15.1.3, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
3.18.1, 10.2.1, 10.2.2, **10.2.8**, 10.3, 10.3.3, 10.4, 11.1.1
Inspections
3.1.3, 3.7.1, 4.2.2, 9.8.2, 9.9.2, 9.10.1, 13.5
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.1.4, 3.3.3, 3.7.1, 4.2.4, 5.2.1, 7, 8.2.2, 12.1, 13.5.2
Instruments of Service, Definition of
1.1.7, 1.5, 1.6
Insurance
6.1.1, 7.3.7, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, 11
Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, **11.3**
Insurance, Stored Materials
9.3.2, 11.3.1
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1, 11.3.1.5
Insurance Companies, Settlement with
11.3.10
Intent of the Contract Documents
1.2, 4.2.18, 4.2.19, 7.4
Interest
9.7, **13.6**
Interpretation
1.4, 4.2.8, 4.2.17, 4.2.18
Interpretations, Written
4.2.17, 4.2.18, 4.2.20
Joinder and Consolidation of Claims Required
15.4.4
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, 3.4, 3.8.2, 3.8.3, 3.12.2, 3.12.3, 3.12.6, 3.12.10, 3.13.1, 3.15.1, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.6, 9.10.2, 10.2.1.2, 11.3.1, 14.2.1, 14.2.2
Labor Disputes
8.3.1
Laws and Regulations
3.2.3, 3.2.4, 3.7, 3.13.1, 10.2.2, 10.2.3, 13.5.1, 14.2.1
Liens
2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
Limitation on Consolidation or Joinder
15.4.4
Limitations, Statutes of
15.4.1
Limitations of Authority
3.12.4, 4.1.3, 4.2.16
Limitations of Liability
9.6.7, 11.1.1, 12.2
Limitations of Time
3.10.1, 4.2.17, 4.2.20, 8.2.1, 9.3.3, 9.6.1, 9.8.4, 9.10.2, 10.2, 11.1.3, 12.1.1, 12.2.2.2, 12.2.5, 13.7, 14.1.1, 15.2.6.1
Loss of Use Insurance
11.3.3
Material Suppliers
1.5.1, 1.5.2, 3.12, 4.2.6, 4.2.8, 9.3.1, 9.3.1.2, 9.3.3, 9.5.3, 9.6.4, 9.6.5, 9.6.7, 9.10.5, 11.3.1
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 1.5.1, 1.5.2, 3.4, 3.5, 3.8.2, 3.8.3, 3.12.2, 3.12.3, 3.12.6, 3.12.10, 3.13.1, 5.2.1, 6.2.1, 9.3.1, 9.3.2, 9.3.3, 9.5.1, 9.5.3, 9.6.4, 9.6.5, 9.6.7, 9.10.2, 9.10.5, 10.2.1, 10.2.4, 10.3
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.5, 4.2.11
Mechanic's Lien
2.1.2, 15.2.8
Mediation
8.3.1, 10.3.5, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1
Minor Changes in the Work
1.1.1, 3.12.8, 4.2.13, 7.1, **7.4**
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 3.11, 4.1.3, 4.2.14, 5.2.3, 7, 11.3.1
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.4.3, 9.8.3, **12.3**
Nonconforming Work, Rejection and Correction of
2.3, 2.4, 3.2.3, 3.7.3, 9.4.3.3, 9.8.2, 9.8.3, 9.9.1, 11.1.1, 12.2.2.1, 12.2.3, 12.2.4, 12.2.5

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Notice
1.5, 2.1.2, 2.2.1, 2.4, 3.2.4, 3.3.1, 3.7.1, 3.7.2, 3.7.5, 3.9.2, 3.12.9, 5.2.1, 6.3, 9.4.1, 9.7, 9.10.1, 9.10.2, 10.2.2, 10.2.6, 10.2.8, 10.3.2, 11.3.6, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1.2, 14.2.2, 14.4.2, 15.1.2, 15.1.4, 15.1.5.1, 15.2, 15.4.1
Notice of Claims
3.7.2, 10.2.8, **15.1.2**, 15.4.1
Notice of Testing and Inspections
13.5.1, 13.5.2
Notices, Permits, Fees and
3.7, 7.3.7, 10.2.2
Observations, On-Site
3.2.1, 9.5.1, 12.1.1
Occupancy
2.2.2, 9.6.6, 9.9, 11.3.1.5
On-Site Inspections
4.2.2, 9.10.1, 9.4.4, 9.5.1
Orders, Written
4.2.7, 4.2.18, 4.2.20
Other Contracts and Contractors
1.1.4, 3.14.2, 4.2.9, 6, 11.3.7, 12.1.2
OWNER
2
Owner, Definition of
2.1.1
Owner, Information and Services Required of the
2.1.2, **2.2**, 4.2, 6.1.2, 6.1.3, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.2, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1, 14.1.3, 15.1.3
Owner's Authority
1.5, 2.1.1, 2.3, 2.4, 3.4.2, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.8, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2, 7.3.1, 8.2.2, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.3.3, 11.3.10, 12.2.2.1, 12.3, 13.5.2, 14.2, 14.3.1, 14.4, 15.2.7
Owner's Financial Capability
2.2.1, 13.2.2, 14.1.1
Owner's Liability Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2.1, 5.3, 5.4.1, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.4, 12.2.4, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction with Own Forces and to Award Other Contracts
6.1
Owner's Right to Stop the Work
2.3
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.5, **1.5**, 1.6, 3.11, 3.12.10, 3.17, 4.2.14, 4.2.18, 4.2.20
Partial Occupancy or Use
9.9, 11.3.1.5
Patching, Cutting and
3.14, 6.2.5
Patents and Copyrights, Royalties
3.17
Payment, Applications for
4.2.1, 4.2.7, 4.2.15, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.7, 9.10.1, 9.10.3, 9.10.5, 11.1.3
Payment, Certificates for
4.2.15, 7.3.9, 9.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 15.1.3
Payment, Failure of
9.4.1, 9.5, **9.7**, 14.1.1.3
Payment, Final
4.2.1, 9.8.2, **9.10**, 11.1.2, 11.3.1, 11.3.5, 12.3, 15.2.1
Payment Bond, Performance Bond and
5.4.1, 7.3.7, 9.6.7, 9.10.2, 9.10.3, 11, **11.4**
Payments, Progress
9.3.1, 9.4.2, **9.6**
PAYMENTS AND COMPLETION
9, 14
Payments to Subcontractors
5.4.2, 9.3, 9.5.1.3, 9.5.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 9.10.5, 14.2.1.2
PCB
10.3.1
Performance Bond and Payment Bond
5.4.1, 7.3.7, 9.6.7, 9.10.2, 9.10.3, 11, **11.4**
Permits, Fees, Notices and Compliance with Laws
2.2.2, **3.7**, 7.3.7.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.9, 4.2.10, 4.2.14
Progress and Completion
8.2, 9.3.1, 9.4.2, 9.6, 9.8, 9.10, 14.2.4, 15.1.6
Progress Payments
9.3.1, 9.4.2, **9.6**
Project, Definition of
1.1.4
Project Representatives
4.2.16
Property Insurance
10.2.5, **11.3**
Project Schedule
3.10.1, 3.10.3, 3.10.4, 4.2.2, 4.2.3, 4.2.4

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PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1, 15.2.8, 15.4
Rejection of Work
3.5, 4.2.8, 12.2.1
Releases of and Waivers and of Liens
9.10.2
Representations
1.3, 2.2.1, 3.5, 3.12, 6.2.2, 8.2.1, 9.3.3, 9.4.3, 9.5.1, 9.8.2, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1
Requests for Information
4.2.20
Resolution of Claims and Disputes
15
Responsibility for Those Performing the Work
3.3.2, 3.7.3, 3.12.8, 3.18, 4.2.2, 4.2.5, 4.2.8, 5.3, 6.1.2, 6.2, 6.3, 9.5.1, 9.8.2, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
1.2.2, **3.2**, 3.7.3, 3.12.7
Review of Contractor's Submittals by Owner, Construction Manager and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 5.2, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor
3.12.5
Rights and Remedies
1.1.2, 2.3, 2.4, 3.7.4, 3.15.2, 4.2.8, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, **13.4**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4
Safety of Persons and Property
10.2, 10.3, 10.4
Safety Precautions and Programs
3.3.1, 3.12, 4.2.5, 5.3, **10.1**, 10.2, 10.3, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.9, 4.2.10
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.2, 15.1.5.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.6, 4.2.11, 6, 8.3.1, 12.1.2
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.9, 4.2.10, 4.2.14
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2.2, 4.2.3, 4.2.15, 9.4.3.3, 9.8.3, 9.9.2, 9.10.1, 13.5
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.15, 9.8.3, 9.9.2, 9.10.1, 13.5
Special Inspections and Testing
4.2.8, 12.2.1, 13.5
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14
Staffing Plan
4.2.3
Statute of Limitations
12.2.5, 13.7, 15.4.1.1
Stopping the Work
2.3, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 4.2.5, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6.2, 9.6.3, 9.10, 10.2.1, 14.1, 14.2
Submittals
3.2.3, 3.10, 3.11, 3.12, 4.2.9, 4.2.10, 4.2.11, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.9, 4.2.10
Subrogation, Waivers of
6.1.1, **11.3.7**
Substantial Completion
8.1.1, 8.1.3, 8.2.3, 9.4.3.3, **9.8**, 9.9.1, 9.10.3, 12.2.1, 12.2.2, 13.7
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
4.1.4
Substitution of Construction Manager
4.1.4
Substitutions of Materials
3.4.2, 3.5, 7.3.8

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User Notes: (1786073166)

Sub-subcontractor, Definition of
5.1.2
Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.3, 4.2.5, 4.2.8, 4.2.9, 4.2.10, 4.2.11, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.3.3, 10, 12, 14, 15.1.3
Surety
5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7
Surety, Consent of
9.10.2, 9.10.3
Surveys
1.1.7, 2.2.3
Suspension by the Owner for Convenience
14.3
Suspension of the Work
5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.7.4
Termination by the Contractor
14.1, 15.1.6
Termination by the Owner for Cause
5.4.1.1, **14.2**, 15.1.6
Termination by the Owner for Convenience
14.4
Termination of the Contractor
14.2.2
TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.4, 3.3.3, 4.2.2, 4.2.6, 4.2.8, 9.4.3.3, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.5**
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2, 7.3.1, 7.4, **8.3**, 9.5.1, 10.3.2, 14.3.2, 15.1.5, 15.2.5
Time Limits
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.1, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.4.2, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.4, 12.2, 13.5, 13.7, 14, 15
Time Limits on Claims
3.7.4, 10.2.8, **13.7**, 15.1.2
Title to Work
9.3.2, 9.3.3
Transmission of Data in Digital Form
1.6
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 7.3.4
Use of Documents
1.1.1, 1.5, 2.2.5, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.4.2
Waiver of Claims by the Construction Manager
13.4.2
Waiver of Claims by the Contractor
9.10.5, 13.4.2, 15.1.6
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6
Waiver of Consequential Damages
14.2.4, 15.1.6
Waiver of Liens
9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, **11.3.7**
Warranty
3.5, 4.2.15, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2
Weather Delays
15.1.5.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.3, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 10.3.2, 11.4.1, 13.2, 13.4.2, 15.4.4.2
Written Interpretations
4.2.17, 4.2.18
Written Notice
2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 5.3, 5.4.1.1, 8.2.2, 9.4, 9.5.1, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, **13.3**, 13.5.2, 14, 15.4.1
Written Orders
1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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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 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 Multiple Prime Contractors and by the Owner's own forces, including persons or entities under separate contracts not administered by the Construction Manager.

§ 1.1.5 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.

§ 1.1.6 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.

§ 1.1.7 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.

§ 1.1.8 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 and certify termination of the Agreement under Section 14.2.2.

§ 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.

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§ 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 will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and material or equipment 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 this Project is not to be construed as publication in derogation of the Architect, or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 Transmission of Data in Digital Form

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

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 Article 4, 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 Information and Services Required of the Owner

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 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, 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, through the Construction Manager, shall secure and pay for the building permit.

§ 2.2.3 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.

§ 2.2.4 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.

§ 2.2.5 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.

§ 2.2.6 The Owner shall endeavor to forward all communications to the Contractor through the Construction Manager and shall contemporaneously provide the same communications to the Architect about matters arising out of or relating to the Contract Documents.

§ 2.3 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.

§ 2.4 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 written 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 deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor 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. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect, after consultation with the Construction Manager. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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 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 plural term "Multiple Prime Contractors" refers to persons or entities who perform construction under contracts with the Owner that are administered by the Construction Manager. The term does not include the Owner's own forces, including persons or entities under separate contracts not administered by the Construction Manager.

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

§ 3.1.4 The Contractor shall not be relieved of 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 2.2.3, 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 make 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 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, unless the Contract Documents give other specific instruction concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and 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 written notice to the Owner, the Construction Manager, and the Architect and shall not proceed with that portion of the Work without further written instructions from the Architect, through the Construction Manager. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required 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 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 authorized by the Architect in accordance with Sections 3.12.8 or 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

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 with 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.

§ 3.6 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, through 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 (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 21 days after first observance of the conditions. The Architect and

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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 an equitable adjustment 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 in writing, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may proceed 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 furnish in writing to the Owner and Architect through the Construction Manager, the name and qualifications of a proposed superintendent. The Construction Manager may reply within 14 days to the Contractor in writing stating (1) whether the Owner, the Construction Manager, or the Architect has reasonable objection to the proposed superintendent or (2) that any of them require additional time to review. Failure of the Construction Manager to reply 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.

§ 3.10 Contractor's Construction Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information and the Construction Manager's approval a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at

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appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project schedule to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. 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 Multiple Prime Contractors or the construction or operations of the Owner's own forces.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter update it as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not unreasonably be 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, 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 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 maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These documents shall be available to the Architect 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 the way by which 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 4.2.9 through 4.2.11. 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 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 Multiple Prime 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 Multiple Prime Contractors.

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§ 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 requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Construction Manager and Architect in writing 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 written 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. 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 cause such services or certifications to be provided by a properly 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 and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, 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 Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 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, and 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 and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

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§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner's own forces or of other Multiple Prime Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner's own forces or by other Multiple Prime Contractors except with written consent of the Construction Manager, Owner and such other Multiple Prime Contractors; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the other Multiple Prime Contractors or the Owner the Contractor's 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 or 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 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 such 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 the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such 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.

§ 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 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 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.

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§ 4.1.2 The Owner shall retain a construction manager lawfully licensed to practice construction management or an entity 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.

§ 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.

§ 4.1.4 If the employment of the Construction Manager or Architect is terminated, the Owner shall employ a successor construction manager or architect as 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.

§ 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 reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner and Construction Manager (1) known deviations from the Contract Documents and from the most recent Project schedule prepared by the Construction Manager, and (2) defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide a staffing plan to include 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 reasonably informed of the progress of the Work, and will report to the Owner and Architect (1) known deviations from the Contract Documents and the most recent Project schedule, and (2) defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Multiple Prime 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, or charge of, 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, except as provided in Section 3.3.1, 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 Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Construction Manager, and shall contemporaneously provide the same communications to the Architect about matters arising out of or relating to the Contract Documents. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with other Multiple Prime Contractors shall be through the Construction Manager and shall be contemporaneously provided to the Architect if those communications are about matters arising out of or related to the Contract Documents. Communications by and with the Owner's own forces shall be through the Owner.

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§ 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. The Construction Manager shall determine in general whether the Work of the Contractor is being performed in accordance with the requirements of the Contract Documents and notify the Owner, Contractor and Architect of defects and deficiencies in the Work. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require additional inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, upon written authorization of the Owner, whether or not such 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, material and equipment suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 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 Multiple Prime Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from Contractor and other Multiple Prime 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.

§ 4.2.10 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.

§ 4.2.11 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, unless otherwise specifically stated by the Construction Manager and Architect, 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.

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

§ 4.2.13 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.

§ 4.2.14 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

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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.

§ 4.2.15 The Construction Manager will assist the Architect in conducting inspections to determine the 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.

§ 4.2.16 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.17 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.

§ 4.2.18 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.

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

§ 4.2.20 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 to 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 Multiple Prime Contractors or subcontractors of other Multiple Prime 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Construction Manager for review by the Owner, Construction Manager and Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Construction Manager may reply within 14 days to the Contractor in writing stating (1) whether the Owner, the Construction Manager or the Architect has reasonable objection to any such proposed person or entity or, (2) that the

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Construction Manager, Architect or Owner requires additional time for review. Failure of the Construction Manager, Owner, or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 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 previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate agreement, written where legally required for validity, 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 responsibility for safety of the Subcontractor's Work, which the Contractor, by these 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 in writing; 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 such 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.

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ARTICLE 6 CONSTRUCTION BY OWNER OR BY OTHER 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, which include persons or entities under separate contracts not administered by the Construction Manager, and to award other contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces including persons or entities under separate contracts not administered by the Construction Manager, the Owner shall provide for coordination of such forces 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor 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, Construction Manager and other Multiple Prime 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 or other Multiple Prime Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Construction Manager and Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's own forces or other Multiple Prime Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a separate contractor or to other Multiple Prime 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 or other Multiple Prime Contractors.

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

§ 6.2.5 The Owner and other Multiple Prime 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, other Multiple Prime 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.

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§ 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.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, 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 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager and Architect 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.

§ 7.3.6 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.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the method and 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 7.3.7 shall be limited to the following:

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.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers compensation insurance;

.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 related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 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 has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order issued through the Construction Manager and shall be binding on the Owner and Contractor.

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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

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§ 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 an act or neglect of the Owner, Owner's own forces, Construction Manager, Architect, any of the other Multiple Prime Contractors or an employee of any of them, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration, or by other causes that the Architect, based on the recommendation of the Construction Manager, determines may justify delay, then the Contract Time shall be extended by Change Order 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

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.

§ 9.2 Schedule of Values

Where the Contract is based on a Stipulated Sum or Guaranteed Maximum Price, the Contractor shall submit to the Construction Manager, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Construction Manager and Architect may require. 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. In the event there is one Contractor, the Construction Manager shall forward to the Architect the Contractor's schedule of values. If there are Multiple Prime Contractors responsible for performing different portions of the Project, the Construction Manager shall forward the Multiple Prime Contractors' schedules of values only if requested by the Architect.

§ 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. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner, Construction Manager or Architect may require, such as copies of requisitions from Subcontractors and material 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 material 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

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Payment all 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, material suppliers, or other persons or entities making a claim by reason of having 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 issue to the Owner a Certificate for Payment, with a copy to the Construction Manager, for such amount as the Architect determines is properly due, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 are Multiple Prime Contractors performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives the Multiple Prime Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Multiple Prime Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Multiple Prime Contractors' application with information from similar applications for progress payments from other Multiple Prime Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Multiple Prime Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.3 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 issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager, for such amount as the Architect determines is properly due, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.4 The Construction Manager's certification of an Application for Payment or, in the case of Multiple Prime Contractors, a Project Application and Certificate for Payment shall be based upon the Construction Manager's evaluation of the Work and the information provided as part of the Application 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 and the quality of the Work is in accordance with the Contract Documents. The certification will also constitute a recommendation to the Architect and Owner that the Contractor be paid the amount certified.

§ 9.4.5 The Architect's issuance of a Certificate for Payment or in the case of Multiple Prime Contractors, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and information provided as part of 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, that the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified.

§ 9.4.6 The representations made pursuant to Sections 9.4.4 and 9.4.5 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.

§ 9.4.7 The issuance of a separate 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 or quantity of the Work, (2) reviewed the Contractor's construction means, methods, techniques,

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sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material 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 9.4.4 and 9.4.5 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 9.4.3. 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 or subsequent observations, 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 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;
- **.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 the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 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 material or equipment suppliers 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 material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner, Construction

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Manager nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment 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 and 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, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 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' written 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 shut-down, 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 requirements of 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 or designated portion thereof is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall 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.

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§ 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such 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 as required under Section 11.3.1.5 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 written 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 will evaluate the completion of Work of the Contractor and then forward the notice and Application, with the Construction Manager's recommendations, 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 terms and conditions of 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 and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, including all costs and reasonable attorneys' fees.

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§ 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 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 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; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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 or the Contractor's Subcontractors or Sub-subcontractors;
- **.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 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 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 owners and users of adjacent sites and utilities.

§ 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

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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, except damage or loss 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, written notice of such 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. 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 report the condition to the Owner, Construction Manager and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify a 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 such material or substance or who are to perform the task of removal or safe containment of such 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 in the amount of the Contractor's reasonable additional costs of shut-down, 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 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 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 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.

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§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance 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 indemnify 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 Liability Insurance

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle; and
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be submitted to the Construction Manager for transmittal to the Owner with a copy to the Architect prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Construction Manager, the Construction Manager's consultants, the Owner, the Architect, and the

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Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 Owner's Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 Property Insurance

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for the Architect's, Contractor's, and Construction Manager's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 Boiler and Machinery Insurance. The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Construction Manager, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 Loss of Use Insurance. The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

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§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, adjoining 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, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 Waivers of Subrogation. 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, and (2) the Construction Manager, Architect, Architect's consultants, separate contractors described in Article 6, 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 covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as the Owner and Contractor may have to the proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, Owner's separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance 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 requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have 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; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or distribution of insurance proceeds in accordance with the direction of the arbitrators.

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§ 11.4 Performance Bond and Payment Bond

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 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.

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 observation 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 which the Construction Manager or Architect has not specifically requested to observe 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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or one of the other Contractors in which event the Owner shall be responsible for payment of such costs.

§ 12.2 Correction of Work

§ 12.2.1 Before or After 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, whether discovered before or after 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 an 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 written 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 or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period 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.

§ 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, whether completed or partially completed, of the Owner or separate contractors or other Multiple Prime Contractors caused by the

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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 except that, 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 such 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 such assignment.

§ 13.3 Written Notice

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity or to an officer of the corporation for which it was intended; or if delivered at or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 Rights and Remedies

§ 13.4.1 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.

§ 13.4.2 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 in writing.

§ 13.5 Tests and Inspections

§ 13.5.1 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and

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(2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 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 13.5.1, 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 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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.

§ 13.5.4 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.

§ 13.5.5 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.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may 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.

§ 13.7 Time Limits on Claims

The Owner and the Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time 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 the Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

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 or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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 promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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' written notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor 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' written 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 for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.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 above reasons exist, the Owner, after consultation with the Construction Manager, and upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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' written 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 as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

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.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 written 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

.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 Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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, 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.

§ 15.1.2 Notice of Claims. Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Construction Manager and or Architect is not serving as the Initial Decision Maker. Claims by either party must 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 Continuing Contract Performance. 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. The Construction Manager will prepare Change Orders and the Architect will issue a Certificate for Payment or Project Certificate for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3.

§ 15.1.5 Claims for Additional Time

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein 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.

§ 15.1.5.2 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.

§ 15.1.6 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

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.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 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, 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 arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no 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 such 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 and the Architect and Construction Manager, if the Architect or Construction Manager 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 an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, 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.

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§ 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 15.1.6 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 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. 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.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Either party, at its sole discretion, 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 Either party, at its sole discretion, 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.

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§ 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 the Owner and Contractor under this Agreement.

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I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:14:50 on 07/12/2016 under Order No. 1767259550_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A232™ – 2009, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

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SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT

(CROSS-REFERENCE AIA DOCUMENT A232/CMa-2009)

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 A232CMa, 2009

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 A232CMa, 2009 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 1.

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.

D. **Article 2 - Owner**

2.3 Owner's Right to Stop the Work

Add new subparagraph 2.3.1

2.3.1 "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 2.4.1.1."

2.4 Owner's Right to Carry Out the Work

Add after second sentence of 2.4 the following sentence:

2.4 Owner's Right to Carry Out the Work

Add after second sentence of 2.4 the following sentence:

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**

3.2 Review of Contract Documents and Field Conditions by Contractor

Add new subparagraph 3.2.5:

3.2.5 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:

3.3.2 Insert the following language (noted in *italic)* in Paragraph 3.3.2: *"…and other persons 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.

3.5 Warranty:

Add the following at the end of 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.

3.9 Superintendent:

Add the following new subparagraph:

3.9.8 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, if requested by the Architect, 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.

3.12 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."

Add the following to the end of paragraph 3.12.5:

"All submissions shall be in accordance with Section 01300 Submissions."

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.

F. **Article 5 - Subcontractors**

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

Add the following Subparagraphs to 5.2.1:

5.2.1.2 Refer to Instructions to Bidders, Section 4, for requirements for delivery of "Contractor's Subcontractor List" to Architect's office after receipt of bids and before award of the Contract."

Delete Subparagraph 5.2.3 in its entirety and substitute the following:

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.

G. **Article 6 - Construction by Owner or By Other Contractors**

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

Add the following Subparagraph to 6.1.2:

6.1.2.1 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 6.2.5:

6.2.5.1 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 Subparagraphs:

6.2.6 All required cutting, patching, and restoring shall be neatly done by mechanics skilled in their specific trades, to the satisfaction of the Architect.

6.2.7 The Contractor shall leave all Work of his trade WHOLE, PERFECT, AND COMPLETE at the final completion of the Work.

H. **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.

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:

8.3.1.4 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.

I. **Article 9 - Payments and Completion**

9.2. Schedule of Values:

9.2.1 In the first 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 9.3.1.3:

9.3.1.3.1 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.

9.3.1.3.2 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:

9.3.2.4 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.

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.

Add the following Subparagraph to 9.10.2:

9.10.2.2 Submittals required above shall be made in accordance with procedures described in Division 1.

Add the following additional Clauses to Paragraph 9.10.4:

.4 Claims for Indemnification;

.5 Claims about which the Owner has given the Contractor written notice;

.6 Claims arising after final payment."

J. **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:

10.2.12 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 10.2.12:

10.2.12.1 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.

10.2.12.2 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.

10.2.12.3 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.

10.2.12.4 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.

K. **Article 11 - Insurance and Bonds**

11.1 Contractor's Liability Insurance:

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.

Add the following Subparagraph to 11.1.2:

11.1.2.1 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.

Add the following Subparagraph to 11.1.3:

11.1.3.1 In addition to the Certificate of Insurance, the Contractor shall provide the Owner with copies of any endorsements subsequently issued amending coverage or limits.

11.3 Property Insurance:

Add the following to Paragraph 11.3.1.1:

"The form of policy for this coverage shall be Completed Value."

Delete Paragraph 11.3.1.4 in its entirety and substitute the following:

11.3.1.4 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.

Delete Paragraph 11.3.10 in its entirety and replace with the following:

11.3.10 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.

11.4 Performance Bond and Payment Bond:

Add the following to Paragraph 11.4.1:

11.4.1 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 11.4.1:

11.4.1.4 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.

L. **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.

Article 15 – Claims and Disputes

15.1 Claims:

Add to Paragraph 15.1.2:

Failure to do so shall be an irrevocable waiver of the Claim.

Modify Paragraph 15.1.5.1 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”

In the event of a continuing delay, only one claim is necessary.

Add the following Subparagraphs to 15.1.5.1:

15.1.5.1.1 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.

15.1.5.1.2 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 15.1.5.2:

15.1.5.2.1 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:

15.1.7 The Owner 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.

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.

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."

Add the following new article in its entirety:

Article 16-Indemnification

16.1.1 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.

16.1.2 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.

16.1.3 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.

16.1.4 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.

16.1.5 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

SECOND SUPPLEMENTARY GENERAL CONDITIONS

If these supplementary general conditions are found to be in conflict with any earlier drafted general conditions or supplementary general conditions, these supplementary general conditions will control.

ARTICLE 1 – GENERAL PROVISIONS

Paragraph 1.1 BASIC DEFINITIONS

Subparagraph 1.1.1 THE CONTRACT DOCUMENTS

Amend last sentence to read as follows:

"Unless specifically eliminated in the Agreement, the Contract Documents include other documents such as Project Specifications, the Project Drawings, the Notice to Bidders, Information for Bidders, Bid Proposal Forms and Certifications, Prevailing Wage Rate Schedule and the written requirements for labor, materials, equipment, construction systems and the like necessary for the Contractor to complete the work for which it has been engaged.

Paragraph 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following subparagraphs:

1.2.5 Each Contractor shall examine the building in which the Work is to be installed and shall acquaint himself fully with the existing conditions which relate to the Work to be performed. He shall compare existing conditions to those shown on Drawings or mentioned in the Specifications. Any discrepancies found between actual conditions and those shown on Drawings; or any interferences found which limit or prevent the proper installation or operation of the Work shown to be performed or specified shall be reported to the Architect before the Proposal is submitted. By submitting the Proposal without such notification to the Architect of discrepancies or interferences, the Contractor agrees that no subsequent modification of the Contract Price will be requested or made by reason of the Contractor's failure to acquaint himself full with existing conditions, the Drawings and the Specifications.

1.2.6 Discrepancies between any Drawings and/or Specifications and the parts thereof, any omissions of detail, materials and/or appurtenances normally required or items that are open to possible variations to interpretation shall be referred to the Architect for clarifications before submitting a bid. In the event of failure on the part of the Bidder to request such clarification before submitting a bid, it shall be assumed that the Contractor has based his bid on supplying and installing all such omissions or, where a discrepancy on matter of interpretation exists, that his bid was based on executing the work in the most expensive manner.

1.2.7 Where references are made to standards and codes, i.e. American Society of Testing and Materials (ASTM), American National Standards Institute (ANSI), Underwriters' Laboratories (UL) and Federal Specifications, in these Specifications, they refer to the latest issue of these Specifications at the time of bidding.

ARTICLE 2 – OWNER

Paragraph 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Subparagraph 2.2.1 – Delete in its entirety.

Paragraph 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

Amend first sentence to read as follows:

"If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a three-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may exercise remedies to correct such deficiencies without prejudice to other remedies the Owner may have, including the Owner's right to have Contractor's surety perform and correct such deficiencies."

Remainder of the paragraph shall remain unchanged, except as otherwise amended by the first supplementary general conditions.

ARTICLE 3 – CONTRACTOR

Paragraph 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following subparagraph:

3.2.6 Should the Contractor encounter conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, he shall immediately give notice to the Architect of such conditions before they are disturbed. The Architect shall thereupon promptly investigate the conditions, and shall at once make such changes in the Drawings and/or Specifications as he may find necessary. Any increase or decrease of cost resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional work and changes.

Paragraph 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following subparagraph:

3.3.4 The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damages which may result from their failure or their improper construction, maintenance or operation. The Contractor shall observe, comply with and be subject to all terms, conditions, requirements and limitations of the Contract and Specifications and shall do, carry on, and complete the entire work to the satisfaction of the Architect and Owner.

Paragraph 3.4 LABOR AND MATERIALS

Add the following subparagraph:

3.4.6 Contractor's Title to Materials – No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has had good title to all materials and supplies used by him in the Work, free from all liens, claims or encumbrances.

Paragraph 3.5 WARRANTY

Amend third sentence of 3.5.1 to read as follows:

"Work, materials, or equipment not conforming to these requirements including substitutions not properly approved or authorized may be considered defective."

Paragraph 3.6 TAXES

Supersede Paragraph 3.6 in its entirety with the following:

The Contractor shall pay all sales, consumer, use and other similar taxes required by Law except for Exempt Organization Contracts stipulated by State Departments of Taxation and Finances in the State where the work is to be performed.

Paragraph 3.9 SUPERINTENDENT

Add the following subparagraph:

3.9.4 Important communications from the Contractor shall be confirmed in writing before considered received. Other communications shall be similarly confirmed by written request in each case.

Paragraph 3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following subparagraphs:

3.11.1 During the progress of the work, the Contractor shall maintain and record on Drawings the location of all buried or concealed work where specific location is not called for on Contract Drawings or where actual installation, alignment or location varies from Contract Drawings.

3.11.2 Such drawings shall also indicate location and type of variation in actual installation from Contract Drawings throughout the work. Prints from these drawings shall be submitted to the Architect for review in the same manner as required for shop drawings.

3.11.3 After the prints are reviewed and returned to the Contractor, he shall deliver to the Architect the "As Built" Mylar drawings and two (2) opaque prints of each drawing.

3.11.4 The Architect shall be the sole judge of the acceptability of any and all drawings.

Paragraph 3.12 SHOP DRAWINGS, PRODUCT DATE AND SAMPLES

Add the following language to the end of Subparagraph 3.12.7:

3.12.7 Shop drawings, samples, brochures, material safety data sheets (MSDS) and other diagrammatic material of work to be furnished under the Contract, reviewed and approved by the Contractor, shall be submitted to the Architect for his review. This material shall be processed by the Architect within a reasonable time and returned to the Contractor bearing the action to be taken.

Paragraph 3.14 CUTTING AND PATCHING

Add the following subparagraph:

3.14.4 All costs caused by defective or ill-timed work shall be borne by the party responsible therefore.

Paragraph 3.15 CLEANING UP

Add the following subparagraph:

3.15.3 It shall be the responsibility of the Contractor to remove all debris accumulated by workmen under his employ from the building or site on a daily basis. All debris shall be disposed of in a dumpster or dumpsters provided and maintained for the duration of the project by the Contractor on the premises. The Contractor to provide dumpster for debris removal and shipping carton disposal.

Add the following paragraphs/subparagraphs:

3.19 UNION DISPUTES

3.19.1 All Union Disputes will be resolved by the Contractor immediately in order to prevent any delays. Should delays occur the Contractor will be held responsible for all damages including extras incurred by other Prime Contractors and charged to the Owner as a result of such delays. Failure to correct any such dispute within seven (7) days shall result in the contract being subject to termination by the Owner.

3.20 MATERIALS/FINISHES

3.20.1 Color selections shall be from the manufacturers specified. If the Contractor submits an equivalent, this equivalent shall meet the Architect's specified product in every respect including texture, color, size, shape and finish. Failure to meet these requirements shall result in the Architect's rejection of the Contractor's substitute manufacturer of submitted material.

3.21 SURVEYS

3.21.1 All grades, lines, levels and bench marks shall be established by and maintained by the Contractor for General Construction Work, who shall be responsible for same.

3.21.2 Verify all grades, lines, levels and dimensions as shown on the Drawings and report any errors or inconsistencies in the above to the Architect before commencing work.

ARTICLE 4 – ARCHITECT AND CONSTRUCTION MANAGER

Paragraph 4.2 –ADMINISTRATION OF THE CONTRACT

Subparagraph 4.2.1

Amend first sentence to read as follows:

4.2.1 The Architect and/or Construction Manager will provide administration of the Contract as described in the Contract documents, and will be an Owner's representative (1) during construction (2) until the final Certificate of Payment is issued and (3) with the Owners concurrence, from time to time during the two-year period for correction of work described in Paragraph 12.2. (3) shall not apply to Architect.

Subparagraph 4.2.2

Amend first sentence to read as follows:

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, to keep the Owner informed about the progress and quality of the portion of work completed and endeavor to use reasonable care to guard the Owner against defects and deficiencies in the Work.

Add the following subparagraph:

4.2.6.1 Any direct communication between the Owner and the Contractor that affects 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 by a modification.

ARTICLE 5 – SUBCONTRACTORS

Paragraph 5.3 SUBCONTRACTUAL RELATIONS

Amend Paragraph 5.3 to read as follows:

5.3 By appropriate written agreement, the Contractor shall require each Subcontractor…"

Remainder of the subparagraph shall remain unchanged.

ARTICLE 7 – CHANGES IN THE WORK

Paragraph 7.2 CHANGE ORDERS

Amend paragraph 7.2 to read as follows:

7.2 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Architect, Construction Manager, and Contractor stating their agreement upon all of the following:

Remainder of subparagraph to remain unchanged.

Paragraph 7.3 CONSTRUCTION CHANGE DIRECTIVES

Amend the first sentence Subparagraph 7.3.1 to read as follows:

7.3.1 A Construction Change Directive is a written order by the Owner or Architect and prepared by the Architect and signed by the Owner, Architect, and Construction Manager, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both."

ARTICLE 9 – PAYMENT AND COMPLETION

Paragraph 9.3 APPLICATIONS FOR PAYMENT

Delete Subparagraph 9.3.1.1 in its entirety and replace with:

"All Applications for Payments must be accompanied by a payroll log from the Contractor and all subcontractors outlining each payroll paid by the Contractor and/or subcontractors, the date of such payroll, all certified payrolls attached to the log, and a signed statement from the Contractor that the information contained in the log and attached to the log is accurate."

Paragraph 9.7 FAILURE OF PAYMENT

Subparagraph 9.7. –In first sentence delete wording "or awarded by binding dispute resolution".

Paragraph 9.10 FINAL COMPLETION AND FINAL PAYMENT

Amend the beginning of the first sentence of Subparagraph 9.10.3 to read as follows:

"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 Architect and Construction Manager so recommend, the Owner may upon application by the Contractor and recommendation by the Architect and Construction Manager, and without terminating the Contract." Remainder of subparagraph shall remain unchanged.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

Paragraph 10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following subsubparagraphs:

10.1.1 The Contractor shall conform to all applicable conditions and safety requirements in the Contract Documents, including but not limited to the Uniform Safety Standards as required by the New York State Education Department, 8 NYCRR 155, the standards and regulations initiated by the Occupational Safety and Health

Administration, Department of Labor (OSHA), Environmental Protection Agency (EPA) and the U.S. Department of Transportation (DOT).

10.1.2 Where solvents, chemicals, etc. are used in the installation and/or cleaning of materials or equipment under this Contract, which might cause injury or sickness to an employee or occupant of the building, they will be used in strict conformance with the manufacturer's direction, material data safety sheets (US Department of Labor Form OSHA 20) in the handling, storage and application of such materials shall be obtained by the Contractor and strictly adhered to. Every precaution shall be taken to prevent seepage of toxic fumes into the building. All hazardous waste material shall not be deposited in any dumpster, in any drain, or any part of the site, but shall be collected in a container specifically authorized by the EPA for the collection of said material, transported in accordance with DOT regulations and legally disposed of. Permits will be obtained for storage, treatment and disposal of all hazardous materials.

Add the following subparagraphs:

10.2.1.5 Some of the proposed work may require various Contractors to enter crawlspace/pipe tunnel areas, and/or access plenum spaces associated with the existing ceiling and wall systems (Typical Throughout). Please be advised that these spaces may contain asbestos containing and asbestos contaminated materials. Any disturbance of such may result in the release of airborne asbestos fibers, therefore potentially creating a hazardous condition to the workers.

10.2.1.6 In accordance with 40 CFR part 763, all Contractors associated with the project are warned of the presence of asbestos containing, and potentially asbestos contaminated, materials within these spaces, and the potential hazard associated with the disturbance of these materials. Each Contractor is required to have workers "certified and licensed to work in an asbestos hazard environment" to fulfill their contract requirements in these areas as part of their base bid."

10.2.1.7 The Contractor is to notify the Owner's representative when work will be undertaken in crawl spaces, plenum areas etc., so that an independent monitoring firm can be available to monitor the activities within these spaces.

Paragraph 10.3 HAZARDOUS MATERIALS

Add the following subparagraphs:

10.3.1.1 Contractor shall not use products containing asbestos, polychlorinated-biphenyl (PCB) or other toxic substances. For all materials, the Contractor shall submit Material Safety Data Sheets (MSDS) as outlined in paragraph 3.12, subparagraph 3.12.7.

10.3.1.2 Contractor shall certify that the products, submitted to the Architect for review, specified to be used in the Project, do not contain toxic substances exceeding minimum federal standards and standards of the State in which the work is being performed.

10.3.1.3 Contractor shall further represent that he shall abide by applicable provisions of AHERA, its implementing regulations and any applicable laws, regulations and requirements of the New York State Education Department.

ARTICLE 11 – INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

Add the following subparagraphs and subsubparagraphs:

11.1.3.1 The Contractor shall not commence work under the Contract AND SHALL NOT BE CONSIDERED "Approved" until he/she has obtained all the insurance required under the foregoing paragraphs; nor shall the Contractor allow any subcontractor to commence work under his Subcontract until he has obtained all similar insurance for protection of himself, the Contractor and the Owner.

11.2 OWNER'S LIABILITY INSURANCE

Add the following to the end of Subparagraph 11.2:

11.2 The Owner, at his option, may maintain additional insurance as will protect it from its contingent liability for damage, for bodily injuries and/or death, and for property damage, which may arise from operations and activities under the Contract.

11.2.1 The Owner is not responsible and shall not be held liable for any loss or damage whatsoever to the property of the Contractor(s) or subcontractor(s).

11.4 PERFORMANCE BOND AND PAYMENT BOND

Add the following subparagraphs:

11.4.3 All bonds must be provided by a bonding company licensed to do business in the State of New York and rated Class A by Best or Moody's Listings. The Contractor shall provide evidence of the required Moody's Listings Class A rating to the satisfaction of the Architect at the time of the Contract signing.

11.4.4 Every Bond must display the Surety's Bond Number. A rider including the following provision shall be attached to each Bond:

1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract documents.

Such addition, alteration, change, extension of time, or other modification of the Contract documents, or 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.

ARTICLE 13 MISCELLANEOUS PROVISIONS

Add the following paragraphs:

13.8 PROJECT SIGN

13.8.1 The Contractor may only display a sign on premises approved by the Architect and Owner as to size and content.

13.8.2 The Contractor shall display a neatly painted sign about 4 feet by 8 feet in size giving the name of the project and his own name, business address. The design and details of such a sign, including content, arrangement, color and design shall be subject to the approval of the Architect and owner.

13.9 MINIMUM RATES OF WAGES AND SUPPLEMENTS

13.9.1 Every Contractor and Sub-Contractor shall submit to the School District within thirty days after issuance of its first payroll, with copies to the Architect and Construction Manager, and every thirty days thereafter, a transcript of the original payroll record, subscribed and affirmed as true under penalties of perjury, as provided by Article 8, Section 220 of the NYS Labor Law. The School District shall be required to receive and maintain such payroll records.

The original payrolls or transcripts shall be preserved for three years from the completion of the work on the awarded project.

13.9.2 In accordance with Section 220, Subdivision 3, and 330d of the Labor Law as amended by Chapter 750 of the Laws of 1956, the Industrial Commissioner, Department of Labor, State of New York has ascertained the Prevailing Rates of Wages, including Supplemental Benefits thereto, which will apply to this Project.

13.9.3 The amounts for supplements listed on the schedule do not necessarily include all types of supplements prevailing in the locality, and a future determination of the Industrial Commissioner may require the Contractor to provide additional supplements. If the amount 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 employees.

13.9.4 Any person or corporation that willfully pays, after entering into such a Contract, less than the established wage schedule, shall be guilty of a misdemeanor and upon conviction shall be punished for such first offence by a fine of FIVE

HUNDRED DOLLARS ($500.00) or by imprisonment for not more than thirty (30) days, or both fine and imprisonment. A second offense carriers heavier penalties.

13.9.5 OSHA 10-hour Construction Safety and Health Course –SA1537-A: Effective July 18, 2008, all Public projects of at least $250,000.00, shall require that all laborers, workers and mechanics working on the site be certified as having successfully completed the OSHA 10-hour Safety and Health Course.
Refer to the preceding Prevailing Wage Schedule for additional information.

13.10 CODES AND STANDARDS

13.10.1 In addition to code compliance specified in the "General Conditions", all Electrical Work shall comply with the requirements of the National Electric Code. All electric equipment furnished and installed shall be of type approved for the specified application by the Underwriters' Laboratories, Inc. and bear their identifying label.

13.10.2 Where a conflict occurs between the standards cited above or between them and these Specifications, the more stringent requirement shall govern.

13.11 TEMPORARY POWER

13.11.1 Electricity for temporary light and power for small tools requiring not more than 10 amp. At 120 volt will be obtained from existing branch circuit. The Contractor shall furnish labor and materials for the installation of additional lamp outlets to provide a minimum of 15 foot candles and for the installation of convenience receptacles as required to supply power for small tools. All extension cords shall be removed at the end of each day and stored. The Contractor shall provide all additional temporary power required to complete the work under his Contract.

13.11.2 The temporary lighting distribution shall confer with the requirement of N.E.C. and OSHA.

13.12 TEMPORARY WATER

13.12.1 Temporary water required for construction shall be obtained on the premises. Extend temporary hose connection to nearest suitable source of water, as directed in the field, and provided to hose bibb connections with shut-off valve at construction site.

13.12.2 The Contractor will be required to guard against the waste of water and shall be responsible for all damage to all work and any part of building and its finishes.

Paragraph 14.1 TERMINATION BY THE CONTRACTOR

Subparagraph 14.1.1.3

Delete in its entirety.

ARTICLE 15 – CLAIMS AND DISPUTES

Paragraph 15.1.3 CONTINUING CONTRACT PERFORMANCE

Supersede the first sentence of Paragraph 15.1.3 with the following:

> Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with the performance of the Contract and the Owner shall, except for claims, continue to make payments in accordance with the Contract Documents.

Paragraph 15.2 INITIAL DECISION

Add a new subparagraph 15.2.1.1

> In the event of any dispute arising as to possible or alleged interference between the various contractors or of any dispute between contractors concerning the responsibility of work required for the project, which may retard the progress of the work, the dispute shall be referred to the Architect. His decision as to the parties at fault and the manner in which the matter may be adjusted shall be binding and conclusive on all parties. Any dispute between the Contractor and his Subcontractors shall be resolved by the Contractors immediately, so as not to cause delay of the work.

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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.

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§ 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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AIA® Document A312™ – 2010

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

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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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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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.

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 Fifty Thousand Dollars ($50,000).

B. The HVAC Contractor shall include in Base Bid 1 the sum of Fifty Thousand Dollars ($50,000).

C. The Plumbing Contractor shall include in Base Bid 1 the sum of Fifty Thousand Dollars ($50,000).

D. The Electrical Contractor shall include in Base Bid 1 the sum of Fifty Thousand Dollars ($50,000).

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.

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.

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

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

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

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

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.

_____

NOTARY PUBLIC, State of New York

BBS ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

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Project:	
Contractor:	
BBS Job No.:	

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:

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

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

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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

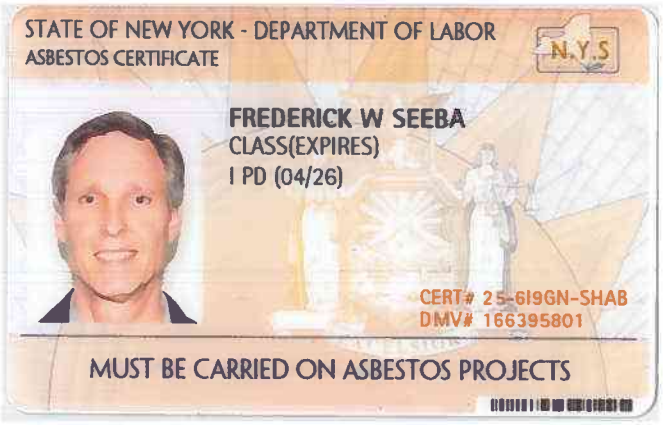
BBS Architects, Landscape Architects and Engineers P.C.
244 E Main Street, Patchogue, NY, 11772

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)
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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 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 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 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 04 – MASONRY

SECTION 042150 – THIN BRICK 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 SCOPE

A. Furnish labor, materials, equipment and appliances required to complete interior and/or exterior Thin Brick masonry work indicated on the Drawings, or described herein and as required to complete the work including environmental requirements of this specification.

B. The work generally includes, but is not limited to:

1. Interior and/or exterior Thin Brick masonry walls consisting of face brick, adhesives, and mortar/grout.

2. Cutting Thin Brick units to fit around existing wall mounted devices, outlets, Thermostats, etc.

3. Cutting and patching for other trades.

4. Grouting, cutting, pointing and cleaning of final masonry surface.

5. Installation over approved substrate acceptable to and detailed in accordance with the manufacturer’s requirements.

6. Mixing and Installation of color based mortar/grout (to match existing when applicable).

7. Clean up and removal of all rubbish and debris.

8. Storage of materials and protection of work and adjoining surfaces to remain.

1.03 RELATED WORK OF OTHER SECTIONS

A. Section 033000 – Cast-in-Place Concrete
B. Section 042000 – Unit Masonry
C. Section 051200 – Structural Steel Framing
D. Section 054000 – Cold Formed Metal Framing
E. Section 061000 – Rough Carpentry
F. Section 079200 – Joint Sealants

1.04 SUBMISSIONS

A. All submittals shall be made in accordance with Section 013300 – Submittal Procedures.

B. Product Data: Submit manufacturer's product data for thin brick system, each type of masonry unit, mortar/grout, accessories, and other manufactured products.

C. Shop Drawings: Provide drawings prepared by the applicator/contractor showing the wall layout, typical details, connections, expansion joints, plus the installation sequence shall be submitted shall be submitted to the architect upon request. Shop drawings shall include the following:

1. Submit elevations, sections and details of assembly components; indicate locations, configurations, large scale plans.

2. Show sequence of installation, attachment details, and weather sealing.

3. Show location of members, other items of work and related work of other Sections to be coordinated with work of this section.

4. Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on the Contract Drawings.

D. Quality Assurance Submittals:

1. Copies of test reports by independent laboratories verifying the performance of the system shall be submitted to the Architect upon request.

2. The certified applicator/contractor shall submit a copy of his current ' Certificate of Trained Applicator' from Brick-It to the architect prior to the application of the Brick-It Metal Grid Panel System.

E. Verification Samples: For each finish product specified, two samples, minimum size 1 inches by 12 inches, representing actual products, styles, colors, patterns, and textures.

1. 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.

2. 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/grout 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.

F. Supplier shall submit a notarized certificate stating that the units supplied conform to these specifications. Submit samples of each type of masonry and pre-cast units for approval to the Architect/Engineer prior to commencement of work.

G. Arrange and pay for project inspection by manufacturer or its authorized representative to confirm warranty will be provided. Notify Architect 48 hours in advance of inspection.

1.05 QUALITY ASSURANCE

A. Single Source Requirements: Provide primary and secondary components required for installation of thin brick systems from a single source.

B. Manufacturer Qualifications: Minimum 20 years’ experience manufacturing similar products.

C. Installer Qualifications:

1. Received instruction by manufacturer's personnel in the installation of the Brick-It System and received a ' Certificate of Trained Applicator' from Brick-It.

2. Five-Years experienced and competent in the installation of brick type materials.

3. If requested, submit a list of recently completed projects using similar materials.

D. Performance Testing:

1. TAS 201 - Large Missile Impact Test
2. TAS 202 - Uniform Static Pressure Test
3. TAS 203 - Cyclic Wind Pressure Load Test
4. E84 - Flame Smoke Test
5. E754 - Shear Pull Test
6. NFPA 285 - All combustible components being required & used in part or as part of the projects composite wall assembly (such as; insulation, weather resistive barrier, sheathing & adhesives) required to meet the NFPA 285 requirements unless otherwise exempt (see Part 2 “Products” 2.2 H. Insulation Board & 2.2 I. WRB).

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. The mock-up shall demonstrate the proposed range of color, texture, and workmanship to be expected in completed work.

2. Locate mock-up on site in location as directed by Architect. Clean the sample panel installation using the same materials and tools as planned for the final construction.

3. Obtain Architect's acceptance of mock-up before start of work.

4. Do not proceed with remaining work until workmanship, color, style, pattern, and texture are approved by Architect.

5. Modify mock-up area as required to produce acceptable work.

6. Remove mock-up at the completion of the work.

7. Mock-up may be incorporated into the work.

F. Conduct a pre-installation meeting to verify all products, application procedures, site conditions and warranty terms.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the location in unopened factory containers. Upon arrival, materials shall be inspected for damage and manufacturer informed of any discrepancies. Deficient materials shall not be used.

B. Materials shall be stored in a protected location and safeguarded from damage.

1.07 DELIVERY, STORAGE, AND HANDLING

A. The ambient air temperature shall remain at 36 degrees F (2.2 degrees C) or greater for at least 72 hours after the application of mortar.

B. Flashing and sealants shall be installed immediately after completion of the system. For outdoor application, provide temporary protection as needed from precipitation, wind, airborne dust and debris, and similar items.

C. Provide protection of surrounding areas and adjacent surfaces from application of brick panel systems.

1.08 COORDINATION / SCHEDULING

A. The work in this section requires close coordination with related specifications sections and trades. Proper labor and equipment shall be employed to ensure a continuous operation satisfactory to the architect.

B. Coordinate installation of brick panel systems with related wall elements, including, windows, doors, louvers, ducts, signage, flashings, sealants, weather resistive barrier, sealant tapes and membranes, supporting wall framing and sheathing, surface mounted objects, and similar items.

1. Coordinate with installation of flashing, coping and sealants to ensure that materials are installed in accordance with manufacturer's instructions.

2. Coordinate with installation of surface-mounted objects to ensure that watertight seal is provided.

1.09 WARRANTY

A. Manufacturer's Warranty: Standard 20-year limited warranty, which include all system components manufactured &/or supplied by Brick-it.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. To establish a level of quality, this section is based upon the Designer Metal Grid System (DMG), as manufactured by Brick-It, 17 Central Ave. Unit 3, Hauppauge, NY 11788; Tel: 631-244-3993; Email: request info (info@brickit.com); Web: www.brickit.com

2.02 BRICK PANEL SYSTEMS

A. Brick Panel Systems: System for aligning and locking thin brick to a substrate that does not depend on adhesive for its performance.

1. System Type: Brick-It (G60) Designer Metal Grid System.

2. System Type: Brick-It (G90) Moisture Control Panel System.

3. System Type: Brick-It (G90) Continuous Insulation Panel System.

4. Wall Fabrication: Brick panel system shall be factory assembled and attached to prefabricated metal stud curtain wall system as indicated on the Drawings and in the Contract Documents.

B. Metal Grid System Panels: Galvanized steel metal components formed to align brick courses and to support and ensure a mechanical bond of each brick in place.

1. Panels shall be chem-dry treated and be a minimum 0.0149-inch thickness with continuous carrying brick ledges (every course of brick) with minimum thickness per ledge: 0.028 inch.
2. Panels shall have a continuous interlock every third course, minimum thickness, 0.042 inch.

3. Panels shall be able to fold out corners, door and window sections, and have a continuous linear array of holes to receive adhesive and have a continuous array of mortar receptors to

lock in mortar mix.

4. Panels shall be designed to carry brick load evenly on entire wall surface without the use of footings, starter angles or special corner sections.

5. Size: 48 inches by x (8.0”,8.25”,9.0”,9.60” or 12” as specified).

6. Size: 96 inches by x (8.0”,8.25”,9.0”,9.60” or 12” as specified).

7. Size: Spacing for Brick Veneer (2-1/4”, 2-1/2”, 2-3/4”, 3-5/8”, & 7-5/8” as specified).

8. Size: Custom size as indicated on the Drawings.

9. Size: Custom size as selected by Architect.

C. Brick: Kiln-fired brick 1/2 to 1 inch nominal thickness, meeting ASTM C 216 (for cut Face Brick) &/or ASTM C 1088 (for extruded Thin Brick), Grade SW, Type TBS, TBX, FBS, FBX, &/or PCI requirements.

1. Brick Color: To be chosen and approved by Architect from www.brickit.com library &/or approved equal.

D. Mortar: Brick-it Type “S” premixed mortar supplied by to meet ASTM C 270 or approved equal.

1. Mortar: Standard grey or white mortar.

2. Mortar: Colored mortar selected by the Architect from Brick-it’s full range of standard available mortar color options (custom colors are available upon request).

3. Mortar Color: As indicated on the Drawings.

E. Fasteners: Brick-it non-corrosive ribbed nails, screws or staples, designed for applicable substrate or approved equal.

F. Adhesives: Brick-it high solid, solvent based silicone or construction adhesive that remains flexible and unaffected by freeze-thaw cycles (cut brick requires the use of Brick-it silicone adhesive only).

G. Water: Shall be clean, potable, and free of all foreign matter.

H. Insulation Board: Green Guard, Owens Corning or Dow minimum 25 PSI, 2” to maximum 6” XPS or approved equal. For Buildings which need to meet NFPA 285 requirements, insulation must be tested in accordance with NFPA 285 guidelines & meet ASTM E1354 requirements such as Carlisle Coatings and Waterproofing R2+Base Max 3” Polyiso, with FR 5/8” Plywood or approved equal.

I. Weather Resistive Barrier: Shall be manufactured by Carlisle, Kingspan, Tyvek or approved equal. For projects which need to meet NFPA 285, WRB must be tested in accordance with NFPA 285 guidelines & meet ASTM E1354 requirements, such as Carlisle Coatings and Waterproofing Fire-Resist Barritech VP/VP LT or approved equal.

J. Rain Screen &/or Drainage Mat: Green Guard DC14, MTI Sure Cavity 3mm or 5mm.

K. Cleaner: Prosoco, SureKleen 600 or approved equal approved for use by Thin Brick Manufacturer.

L. Masonry Sealer: Manufacturer's recommended sealer, applied to brick and mortar joints.

M. Sealant Systems: Acceptable to Brick-It, color as selected by Architect. Joint design and surface preparation shall be based on sealant manufacturer's recommendation and project conditions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation, examine substrate for conditions including soundness, tightness of connections, crumbling or looseness of surfaces, and projections. Verify substrate is acceptable to authorities having jurisdiction prior to installation of the work of this Section.

B. Report deviations from the requirements of project specifications or other conditions that might adversely affect the installation to the Contractor. Do not start work until deviations are corrected.

3.02 SUBSTRATE PREPARATION

A. Substrate shall be one of the following, either existing, as detailed on the drawings or specified elsewhere:

1. Concrete.

2. Masonry.

3. Stud framing with Dens-Glass or cement board sheathing and weather barrier membrane. If not specified elsewhere, install Tyvek Commercial weather barrier membrane as part of the work of this section.

B. Ensure substrate is flat, to within 1/8 inch within any 4 foot square area. Correct any substrate issues as required to a condition acceptable to the manufacturer. Repair damaged or cracked surfaces.

C. Remove surface contaminants on concrete and masonry surfaces, such a form release oils, dust, paint, waterproofing, and similar items. If required by manufacturer, apply conditioner to substrate by sprayer or roller to chalking or excessively absorptive surfaces.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions as applicable to each type of substrate required. Install bricks to specified pattern and mortar.

B. Coordinate installation of brick panel systems with related wall elements, including, windows, doors, louvers, ducts, signage, flashings, sealants, weather resistive barrier, sealant tapes and membranes, supporting wall framing and sheathing, surface mounted objects, light fixtures, cameras, and similar items.

C. Metal Grid: Apply to substrate surface in the true level rows, interlock at every panel. Install such that panel does not extend 1/4 inch below the face of the brick.

1. Offset vertical grid joints and leave 1/4 inch between joints. Install for brick to extend past grid by 1/2 inch at grid ends.

2. Fasten grid system to sound substrate or wall with non-corrosive fasteners; minimum penetration of substrate is 1 inch. Concrete and masonry walls require fasteners and adhesive on rear of metal grid.

3. Install fasteners on an average of 3 per square foot and at top and bottom courses vertically and a maximum of 16 inches on center horizontally.

D. Adhesive:

1. Brick shall be spaced to ensure that the head joints do not exceed 5/8 inch or fall below 1/4 inch. The optimum head joint size is 7/16 inch.

2. Use adhesive supplied by manufacturer. For exterior installations, apply 3/8 inch vertical dabs. For interior applications, apply 3/8-inch beads over adhesive holes as shown in manufacturer's literature.

3. Do not use excessive adhesive as this will cause bricks to tilt away from grid. Check periodically and repress to grid.

4. Allow adhesive 24 hours to dry before mortaring.

E. Brick Placement:

1. Applications Requiring Corners:

   a. Start with corner brick, or a corner brick at each corner if there are corners at both ends.
   b. Install bricks adjusting vertical joints for fit or cut brick as required.

2. Applications that do not required corners:

   a. Install bricks in direction of arrows as shown in manufacturer's literature.
   b. Place adhesive on two rows of grid in the middle of wall.
   c. Adjust vertical joints to fit area, 3/8 inch to 1/2 inch, to fit wall space.
   d. Cut end bricks as needed. Install bricks horizontally than vertically.
   e. Draw a plumb vertical line every 48 inches to help maintain spacing.

3. Brick shall be spaced to insure that the head joints do not exceed 5/8 inch or fall below 1/4 inch. The optimum head joint size is 7/16 inch.

4. For applications requiring corners, start with corner brick, or a corner brick at each corner if there are corners at both ends. Provide special corner brick units to accommodate 45 degree corners. Install bricks adjusting vertical joints for fit or cut brick as required.

5. Install brick in running bond unless otherwise indicated to match existing patterns.

6. Provide all closures and special brick shapes required. Provide standard manufactured sizes or cut full sized masonry for fractional course height and lengths.

7. Layout and install units with a minimum amount of cutting. Where required, cut brick with a saw. No water shall be used.

8. Install items required to be built-in with masonry including lintels, doors, windows, louvers, grilles, flashing, joint reinforcement, anchors and other work specified under this section and/or furnished by other trades and contracts.

F. Mortar:

1. Allow adhesive to fully cure before mortaring joints.

2. Use clean, cold water to mix mortar. Flush hoses regularly; especially during warm weather.

3. Slightly dampen bricks before mortaring; especially during hot weather.

4. Mix properly and test a sample area.

5. Do not apply mortar to brick panel system when the ambient outdoor temperature is below 36º F unless temporary protection and heat can be provided for a minimum of 36 hours after installation.

6. Apply mortar into horizontal joints first, then vertical joints. Over fill joints with enough mortar to avoid leaving any voids. When mortar attains a firm consistency joints shall be tooled.

7. Use the joint tool supplied with the mortar kit to strike joints. Press the tool against the joint and strike joint to fill and seal mortar to edges of brick. Strike the vertical joints first than horizontal joints. Provide concave finish. Fill voids.

8. Provide protection of surrounding areas and adjacent surfaces from application of brick panel systems.

9. Cut or rake out defective joints and repoint with mortar, tooling to match adjacent joints.

G. Sealer: Apply only after mortar joints are thoroughly cured. Allow a minimum of 2 weeks prior to application.

1. Seal exterior and interior applications in accordance with manufacturer's recommendations.

H. Expansion Joints:

1. Provide expansion joints between new and existing walls, between new walls and underside of existing roof structure, and where may be present in the substrate.

3.04 FIELD QUALITY CONTROL

A. Arrange and pay for project inspection by Brick-It or its authorized representative to confirm warranty will be provided. Notify Architect 48 hours in advance of inspection.

3.05 CLEANING AND PROTECTION

A. Cleaning: As recommended by manufacturer. Do not begin cleaning until mortar joints are properly cured. Allow a minimum of 24 to 72 hours. Soak bricks and mortar joints before applying cleaner.

1. Thoroughly flush wall after cleaning.

2. Clean adjacent materials and surfaces of all foreign materials resulting from the work of this Section.

B. Protection:

1. Protect installed materials from water impinging on the visible surface, chinking, sealants joints, and from behind.

2. Protect installed materials from dust, dirt, precipitation, freezing, damaged, spilled materials, and continuous high humidity until they are fully dry.

3.06 REPLACEMENT MATERIALS

A. At completion of project, deliver to Owner extra stock of materials used on project as follows:

1. Minimum 2 percent of replacement stock for each brick type.

B. Store in location as directed by Owner. Ensure materials are boxed and identified by manufacturer, type, and color.

END OF SECTION

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 05 – METALS

SECTION 055000 – METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Provide all miscellaneous metal and metal fabrications, complete and installed, as shown on the Drawings, specified herein, or needed for a complete and proper installation of all building components, which may not be specifically called for under other sections of these Specifications.

B. Related Sections:

1. Section 042000 – Unit Masonry
2. Section 051200 – Structural Steel
3. Section 052100 – Steel Joists and Girders
4. Section 053000 – Metal Decking
5. Section 054000 – Cold-Formed Metal Framing
6. Section 055200 – Metal Railings
7. Section 055210 – Aluminum Railings
8. Section 057300 – Decorative Metal Railings

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified herein and as listed in Section 014219 – Applicable Standards.

B. Qualifications of Personnel: 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. Welding: Perform all shop and field welding required in connection with the work of this Section, adhering strictly to the current pertinent recommendations of the American Welding Society.

1.03 SUBMISSIONS

A. Comply with provisions of Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Complete materials list of all items proposed to be furnished and installed under this Section.

2. Manufacturers' product data, specifications, and other data required to demonstrate compliance with specified requirements.

C. Shop Drawings: The Contractor shall prepare and submit shop drawings covering all items of work of this section. The drawings shall show all dimensions and details of construction, installation and relation to adjoining and related work where same requires cutting or close fitting, and shall show all reinforcement, gauges of metal, anchorage, reinforcing, and other work required for complete installation.

1. Provide templates for bolts and/or anchorage installation by other trades.

1.04 COORDINATION

A. All work under this section shall be properly coordinated with the work of other sections and contracts which affects or is affected by work of this section. To this end, close cooperation shall exist between trades and/or Contractors installing other work in any way affecting or affected by work under this section.

B. Shop drawings shall be exchanged between the trades and/or Contractors so affected to the end that all work shall properly receive or be received by work under other sections, and the entire operation shall be a harmonious whole.

1.05 WORKMANSHIP AND INSTALLATION

A. All work included under this section shall be installed by the contractor at the proper time, and as rapidly as progress of the adjacent and connecting work will permit. All work to be set by others shall be delivered when required by them. The Contractor shall consult with the various other contractors installing adjoining work regarding the methods to be employed in connecting the several materials. Holes and connections for the work of other trades shall be provided as necessary.

B. All work shall be erected and secured plumb and true to line, and finished smooth and clean from fine and noticeable irregularities or file marks. Ferrous metals entering or adjoining exterior masonry surfaces shall be insulated from it with lead shields and by an approved non-staining elastic cement of approved color.

1.06 VERIFYING CONDITIONS

A. Verify all measurements in the field, as required, for work fabricated to fit conditions at the building. Before starting work, examine all adjoining work on which the work of this section is in any way dependent for perfect workmanship and fit. Do such corrective work to adjoining work as may be necessary to make the work of this section perfect in all respects.

1.07 PRODUCT HANDLING

A. 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 all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

A. All metals shall be free from defects impairing strength or durability, and of best commercial quality for purposes specified. Metals shall be made with structural properties to withstand safely the strains and stresses to which they will normally be subjected.

B. For fabrication of the work of this Section which will be exposed to view, use only those materials which are smooth and free from surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.

C. Standards: All materials shall comply with the latest version of the standard documents indicated:

1. Steel plates, shapes, and bars: ASTM A36.

2. Steel plates to be bent or cold formed: ASTM A283, Grade C.

3. Steel tubing, hot-formed, welded, or seamless: ASTM A501.

4. Steel bars and bar-size shapes: ASTM A306 Grade 65, or ASTM A36.

5. Cold-finished steel bars: ASTM A108, grade as selected by the fabricator.

6. Cold-rolled carbon steel sheets: ASTM A336.

7. Galvanized carbon steel sheets: ASTM A526, with ASTM A525, G90, zinc coating.

8. Stainless steel sheets: Type 302/304 of American Iron and Steel Institute, 24 gauge, with No. 4 finish.

9. Gray iron castings: ASTM A48, Class 30.

10. Malleable iron castings: ASTM A47, grade as selected by the fabricator.

11. Steel pipe: ASTM A53, type as selected, Grade A, black finish unless galvanizing is required, standard weight (Schedule 40) unless otherwise indicated.

12. Concrete inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A153.

13. Non-shrink non-ferrous grout: CE CRD C588.

14. Aluminum extrusions shall be free of roll marks, scratches, rolled-in streaks and any other defect which may affect the uniform appearance of finished surfaces.

15. Aluminum extrusions must be at least 0.8" thick and sheet or plate, at least No. 16 gauge.

16. Aluminum pipe: 6063-T6 alloy.

17. Schedule of Aluminum Finishes:

    a. Exposed exterior extrusions (except saddles, louvers, railings, and windows): 215-R1.

    b. Exposed exterior sheet and plate: 215-R1.

    c. Exposed interior extrusions: 204-R1.

    d. Exposed interior sheet and plate: 204-R1.

    e. Extrusion, sheet plate not exposed: Mill.

    f. Casting: F.

2.02 WORKMANSHIP

A. General workmanship requirements:

1. Use materials of size and thickness shown, or if not shown, of required size and thickness to produce sufficient strength and durability in the finished product.

2. Work to dimensions shown or accepted on the Shop Drawings, using proven details of fabrication and support.

3. Use type of materials shown or specified for the various components of the work.

4. Form exposed work true to line and level, with accurate angles and surfaces and with straight, sharp edges.

5. Ease the exposed edges to a radius of approximately 0.8-mm (1/32") unless otherwise shown.

6. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

7. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.

8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, use Phillips flat-head (countersunk) screws or bolts.

9. Provide for anchorage of the type shown. Coordinate with supporting structure. Fabricate and space the anchoring devices to provide adequate support for intended use.

10. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

2.03 FABRICATIONS

A. Rough hardware:

1. Provide bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete and other structures.

2. Manufacture or fabricate items of sizes, shapes, and dimensions required.

3. Provide malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

B. Loose bearing and leveling plates:

1. Provide loose bearing and leveling plates for steel items bearing on concrete construction, made flat, free from warps or twists, and of required thickness and bearing area.

2. Drill plates for anchor bolts and for grouting as required.

3. Galvanize after fabrication.

C. Miscellaneous framing and supports:

1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete work.

2. Fabricate miscellaneous units to sizes, shapes, and profiles shown; or, if not shown, of required dimensions to receive adjacent other work to be retained by framing.

3. Fabricate the miscellaneous units from structural steel shapes, plates, and steel bars of welded construction with mitered joints for field connection, unless otherwise shown.

4. Cut, drill, and tap units to receive hardware.

5. Equip units with integrally welded anchors for casting into concrete or building into masonry, and furnish inserts if units must be installed after concrete is placed.

6. Except as otherwise shown on Construction Drawings, space anchors at 24" on centers, and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

7. Galvanize miscellaneous frames and supports where indicated.

D. Loose Lintels:

1. Provide loose lintels for all trades, over all openings where lintels are not shown on structural drawings or where door bucks over 3'-0" wide are not reinforced. Provide loose lintels for all door bucks, greater than 5'-0" carrying masonry above. For each 4" thickness of masonry, provide one 3 1/2" x 3 1/2" x 5/16" angle at spans 3'-0" or less; 6" x 3 1/2" x 3/8" angle at spans 3'-0" to 6'-4". For 6" thick walls, provide WT 7 x 11 for spans 3'-0" to 6'-4". For spans 6'-4" to 8'-0" at 6" walls, provide WT 7 x 13. Provide lintels at heads of all aluminum bucks where not indicated on structural drawings.

2. All exterior lintels and miscellaneous framing to be galvanized.

E. Steel framed stairs:

1. General:

a. Use welding for joining pieces together, unless otherwise shown or specified. Fabricate units so that bolts and other fastenings do not appear on finish surfaces. Make joints true and tight, and make connections between parts lightproof tight. Provide continuous welds, ground smooth where exposed.

b. Construct stair units to conform to sizes and arrangements shown. Provide all components for the support of stairs and platforms.

2. Stair framing:

a. Fabricate stringers from structural steel channels, or plates, or a combination thereof as shown. Provide closures for ends of stringers.

b. Construct platforms of structural steel channel headers and miscellaneous framing members in the arrangement shown. Bolt or weld stringers to stringers.

3. Metal pan units: Form from structural steel sheet of the gauge shown on the drawings, and to the configuration shown on the drawings. Provide platforms of the same metal and gauge as indicated for pans, unless otherwise indicated.

F. Saddles:

1. Saddles shall be cast abrasive aluminum fitted to full width of frame opening.

2. Set level by shimming in full bed of mastic and fasten with FHCS screws.

2.04 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use and where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Standards: All fasteners shall comply with:

1. Bolts and nuts: Regular hexagon-head type, ASTM A307, Grade A.

2. Lag bolts: Square-head type, Fed. Spec. FF-B-561.

3. Machine screws: Cadmium plated steel, Fed. Spec. FF-S-92.

4. Wood screws: Flat-head carbon steel, Fed. Spec. FF-S-111.

5. Plain washers: Round, carbon steel, Fed. Spec. FF-W-92.

6. Masonry anchorage devices: Expansion shields, Fed. Spec. FF-S-325.

7. Toggle bolts: Tumble-wing type, Fed. Spec. FF-B-588, type, class, and style required.

8. Lock washers: Helical spring type carbon steel, Fed. Spec. FF-W-84.

2.05 PAINT/FINISHING

A. Shop priming:

1. Shop prime all ferrous miscellaneous metal work, except surfaces and edges to be field welded and galvanized surfaces, unless otherwise specified.

   a. Remove oil, grease, and similar contaminants in accordance with SSPC-SP-1.

   b. Clean off heavy rust and loose mill scale in accordance with SSPC-SP-2 or SSPC-SP-3.

   c. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's recommendations, and at a rate to provide the recommended dry film thickness.

2. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

3. Primer for ferrous metals: 10-1009 Gray Metal Primer by Tnemec Co., Inc.

4. Primer for Loose and Hung Steel Lintels: 50-330 Poly-Ura-Prime by Tnemec Co., Inc.

   a. 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 such as windows or louvers that would conceal the lintel or portion thereof.

5. Non-visible ferrous metals, such as structural steel, bearing plates or anchorage, which will be exposed to building cavities or set below grade shall be painted with Benjamin more M47/M48 Coal Tar Epoxy.

6. All listed primers shall be compatible with finish coats of paint. Coordinate selection of metal primer with actual finish paint provided under Section 09900 of these Specifications.

2.06 GALVANIZING

A. Provide hot-dip zinc coating for those items shown or specified to be galvanized, as follows:

1. ASTM A153 for galvanizing iron and steel hardware.

2. ASTM A123 for galvanizing rolled, pressed, and forged steel shapes, plates, bar, and strip 3 mm (1/8") thick and heavier.

3. ASTM A386 for galvanizing assembled steel products.

B. Galvanizing repair paint: Use a high zinc dust content paint for regalvanizing welds in galvanized steel, or to repair damage incurred during handling and installation, complying with MIL SPEC MIL-P-21035.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which miscellaneous metal items are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to project site.

3.03 INSTALLATION

A. Setting loose plates:

1. Clean concrete bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.

2. Set loose leveling and bearing plates on wedges, or other adjustable devices.

3. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims; but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

4. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

B. Setting lintels:

1. Bear 8" minimum at each side of opening wherever possible. Furnish clip angles or other approved connection securely anchored to supporting construction and bolt to lintels wherever 8" bearing is not possible.

C. Installing stairs:

1. Install in accordance with approved shop drawings, providing all anchorage, welding, or bearing as specified on said shop drawings.

D. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

E. Cutting, fitting, and placement:

1. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications.

2. Set work accurately in location, alignment, and elevation, and make plumb, level, true, and free from rack, measured from established lines and levels.

3. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.

4. Fit exposed connections accurately together to form tight hairline joints.

5. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.

6. Grind exposed joints smooth, and touch up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

F. Field welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of weld made, and methods in correcting welding work.

G. Touch up painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 2.0 mils.

3.04 CLEANING, ACCEPTANCE, AND PROTECTION

A. All work shall be properly protected from defacement or damage. Defective work shall be satisfactorily repaired or removed and replaced at no additional cost to the Owner.

B. Upon completion, inspection, and approval by the Architect, the ornamental work of this section shall be cleaned with a mild soap and water or a petroleum distillate and all temporary protective coatings removed, except Methacrylate Lacquer.

C. All operative items shall be adjusted to work properly and the work left whole, clean, and in perfect condition.

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 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

SECTION 072713 – SELF-ADHERED NON-PERMEABLE AIR BARRIER MEMBRANE

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. General Conditions, Supplementary Conditions, Instructions to Bidders and Division 01 General Requirements shall be read in conjunction with and govern this section.

B. This Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their Work.

1.02 DESCRIPTION

A. Supply labor, materials and equipment to complete the Work as shown on the Drawings and as specified herein to bridge and seal the following air leakage pathways and gaps:

1. Connections of the walls to the roof air barrier.
2. Connections of the walls to the foundations.
3. Seismic and expansion joints.
4. Openings and penetrations of window and door frames, store front, curtain wall.
5. Piping, conduit, duct and similar penetrations.
6. Masonry ties, screws, bolts and similar penetrations.
7. All other air leakage pathways in the building envelope.

B. Materials and installation methods of the primary air/vapor barrier membrane system and accessories.

C. Materials and installation methods of through-wall flashing membranes.

1.03 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete
B. Section 042000 – Unit Masonry
C. Section 054000 – Cold Formed Metal Framing
D. Section 061000 – Rough Carpentry
E. Section 061643 – Exterior Gypsum Sheathing
F. Section 072100 – Building Insulation
G. Section 072113 – Ultra Wall Insulation and Air Barrier System
H. Section 076000 – Flashing and Sheet Metal
I. Section 079200 – Joint Sealants
J. Various Division 07 Roofing Specifications – requirement for coordination sequencing of membrane roofing; requirement to seal roof membrane to wall air barrier.
K. Section 084113 – Aluminum Entrances and Storefronts
L. Section 084413 – Glazed Aluminum Curtain Walls
M. Section 085113 – Aluminum Windows

1.04 REFERENCES

A. The following standards are applicable to this section:

1. ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

2. ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
3. ASTM E283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
4. E1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls.
5. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
6. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
7. ASTM E96: Water Vapor Transmission of Materials.
8. CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.

1.05 SUBMITTALS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

B. Submit documentation from an approved independent testing laboratory certifying the air leakage and vapor permeance rates of the air barrier membranes, including primary membrane and transition sheets, exceed the requirements of the Building Code of New York State Energy Code and in accordance with ASTM E2178.

1. Test report submittals shall include test results on porous substrate and include sustained wind load and gust load air leakage results.

C. Submit copies of manufacturers' current ISO certification.

D. Submit manufacturers' current product data sheets for the air barrier membrane system.

1.06 QUALITY ASSURANCE

A. Submit document stating the applicator of the primary air/vapor barrier membranes specified in this section is qualified by the manufacturer as suitable for the execution of the Work.

B. Perform Work in accordance with manufacturer's written instructions and this specification.

C. Maintain one copy of manufacturer's written instructions on site.

D. Allow access to Work site by the air barrier membrane manufacturer's representative.

E. Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, and adhesives.

F. Single-Source Responsibility:

1. Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.

2. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.07 MOCK-UP

A. Construct mock-up in accordance with Section 042000, including all components of the specified wall system.

B. Where directed by architect, construct typical exterior wall panel, 6 foot long by 6 foot wide, incorporating substrate, window frame, attachment of insulation and showing air barrier membrane application details.

C. Mock-up to be reviewed and approved by architect before proceeding with air barrier work. Mock-up may remain as part of the Work.

D. Test mock-up for air and water infiltration to conform with Quality Control, in accordance with ASTM E 783 and ASTM E1105.

1.08 PRE-INSTALLATION CONFERENCE

A. Pre-installation conference shall convene prior to commencing of work of this section.

B. Ensure all contractors responsible for creating a continuous plane of air tightness are present.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to current Product MSDS for proper storage and handling.

B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

C. Store role materials on end in original packaging. Protect rolls from direct sunlight until ready for use.

D. Store air barrier membranes, adhesives and primers at temperatures of 40°F and rising.

E. Keep solvent away from open flame or excessive heat.

F. Wasted Management and Disposal.

1. Separate and recycle all waste materials.

1.10 COORDINATION

A. Ensure continuity of the air seal throughout the scope of this section.

1.11 ALTERNATES

A. 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.

B. Alternate submission to include:

1. Evidence that alternate materials meet or exceed performance characteristics of Product requirements as well as documentation from an approved independent testing laboratory certifying the air leakage rates and vapor permeance rates of the air barrier membranes, including primary membrane and transition sheets, exceed the requirements of the Building Code of New York State Energy Code and in accordance with ASTM E2178.

2. Copies of the manufacturer’s current ISO certification.

3. Ten (10) references clearly indicating the membrane manufacturer has successfully completed projects of similar scope and nature for a minimum of ten (10) years.

4. Manufacturer's complete set of details for air barrier membrane system showing a continuous plane of air tightness throughout the building envelope.

1.12 WARRANTY

A. Provide manufacturer's standard 10-year material warranty.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Air/vapor barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

1. Acceptable Manufacturer:

   Henry Company
   999 N Sepulveda Blvd, Suite 800
   El Segundo, CA 90245
   (800) 598-7663
   www.Henry.com

B. Manufacturer's Standard Products indicated within this section are to establish a level of quality. Equivalency is permitted in accordance with General Municipal Law.

2.02 MEMBRANES (BASIS-OF-DESIGN)

A. Primary sheet air/vapor barrier membrane shall be Blueskin® SA manufactured by Henry; an SBS modified bitumen, self-adhering sheet membrane complete with a blue engineered thermoplastic film. For application temperatures down to 10 degrees F use Blueskin® SA LT. Membrane shall have the following physical properties:

1. ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies,

2. Air leakage: <0.0001 CFM/ft² @1.6 lbs/ft2 to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft2 for 1 hour and gust wind load pressure of 62.8 lbs/ft2 for 10 seconds when tested at 1.6 lbs/ft2 to ASTM E331,

3. Vapor permeance: 0.03 perms to ASTM E96 (Desiccant Method),

4. Vapor permeance: 0.08 perms to ASTM E96 (Wet Cup Method),

5. Membrane Thickness: 0.0394 inches (40 mils),

6. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M,

7. Elongation: 200% to ASTM D412-modifed,

8. Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements.

B. Alternate self-adhering membrane for all window and window sill flashings, door openings, inside and outside corners and other transitions shall be HE200 AM Metal Clad manufactured by Henry; a SBS modified bitumen, self-adhering sheet membrane complete with surface layer of metallic

aluminum film that many sealants adhere well to. Membrane shall have the following physical:

1. Peel Adhesion to Primed Steel 15.0 to ASTM D 1000
2. Vapor Permeance: < 0.014 perms to ASTM E 96
3. Membrane Thickness: 0.0443 inches (45 mils)
4. Low temperature flexibility: -15 degrees F to ASTM D146 min
5. Elongation: 40% to ASTM D412-modifed min

C. Liquid-applied flashing alternate to self-adhered flashing membranes for all window, door, MEP penetrations, inside/outside and dissimilar material connections shall be Air-Bloc LF manufactured by Henry; a moisture-curing single component STPe liquid-applied flashing compatible with a variety of substrates and all Henry liquid and self-adhered air barrier membranes. Liquid-flashing shall have the following physical properties:

1. Elongation: minimum 250% minimum to ASTM D412,
2. Tensile Strength: 132% psi minimum to ASTM D412,
3. Nail Sealability: Pass to AAMA 711,
4. VOC Content: 25 g/L max,
5. Solids Content by Volume: 95%,
6. Moisture Absorption: .1% to ASTM D570

D. Through-wall flashing membrane (Self-Adhering) shall be Blueskin® TWF manufactured by Henry; an SBS modified bitumen, self-adhering sheet membrane complete with a yellow engineered thermoplastic film. Membrane shall have the following physical properties:

1. Membrane Thickness: 0.0394 inches (40 mils),
2. Film Thickness: 4.0 mils,
3. Flow (ASTM D5147): Pass @ 212 degrees F,
4. Puncture Resistance: 134 lbf to ASTM E 154,
5. Tensile Strength (film): 5000 psi minimum ASTM D 882,
6. Tear Resistance: 45lbs.-MD, 17lbs.-CD to ASTM D1004,
7. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M

2.03 PRIMER

A. Primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac™ Primer manufactured by Henry; a polymer emulsion based adhesive, quick setting. Primer shall have 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 degrees F

B. Adhesive for self-adhering membranes at all temperatures shall be Blueskin® Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:

1. Color: Blue,
2. Weight: 6 lbs/gal,
3. Solids by weight: 35%,
4. Drying time (initial set): 30 minutes

C. Adhesive with low VOC content for self-adhering membranes at all temperatures shall be Blueskin® LVC Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:

1. Color: Blue,
2. VOC: <240 g/L,
3. Solids by weight: 40%,
4. Drying time (initial set): 30 minutes

2.04 PENETRATION AND TERMINATION SEALANT

A. Termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:

1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A,
3. Complies with ASTM C 920, Type S, Grade NS, Class 25,
4. Elongation: 450 – 550%,
5. Remains flexible with aging,
6. Seals construction joints up to 1 inch wide

2.05 INSULATION ADHESIVE

A. Insulation adhesive shall be Air-Bloc 21 Insulation Adhesive manufactured by Henry; a synthetic, trowel applied, rubber based adhesive, having the following physical properties:

1. Compatibility: With air barrier membrane, substrate and insulation,
2. Air leakage: 0.0026 CFM/ft^2 @ 2.1 lbs/ft^2 to ASTM E283,
3. Water vapor permeance: 0.03 perms to ASTM E96,
4. Long term flexibility: CGSB 71-GP-24M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify architect in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrates.

B. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane. Strike masonry joints flush.

C. Where curing compounds are used they must be clear resin based without oil, wax or pigments.

D. Do not proceed with application of air barrier membrane when rain is expected within 24 hours.

E. Condition materials to room temperature prior to application to facilitate handling.

3.02 SURFACE PREPARATION

A. Surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane.

B. New concrete should be cured for a minimum of 14 days and must be dry before air/vapor barrier membranes are applied.

C. Ensure all preparatory Work is complete prior to applying primary air/vapor barrier membrane.

D. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

E. Apply primer at rate recommended by manufacturer to all areas to receive self-adhering sheet air/vapor barrier membrane and or through-wall flashing membrane as indicated on drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by self-adhering membrane or self-adhering through-wall flashing membrane during the same working day must be re-primed.

3.03 INSTALLTION OF AIR BARRIER SYSTEM

A. INSIDE AND OUTSIDE CORNERS

1. Seal inside and outside corners of sheathing boards with a strip of self-adhering air/vapor barrier membrane extending a minimum of 3 inches on either side of the corner detail.

    a. Prime surfaces as per manufacturers' instructions and allow to dry.

    b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.

    c. Roll all laps and membrane with a counter top roller to ensure seal.

B. TRANSITION AREAS

1. Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air/vapor barrier membrane.

    a. Prime surfaces as per manufacturers' instructions and allow to dry.

    b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.

    c. Ensure minimum 2 inch overlap at all end and side laps of membrane.

    d. Roll all laps and membrane with a counter top roller to ensure seal.

C. WINDOWS AND ROUGH OPENINGS

1. Wrap rough openings with self-adhered air/vapor barrier membrane as detailed.

    a. Prime surfaces as per manufacturers' instructions and allow to dry.

    b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.

    c. Roll all laps and membrane with a counter top roller to ensure seal.

D. LIQUID-APPLIED FLASHING OPTION – (when approved by the Architect)

1. Use for door and window openings, MEP penetrations and dissimilar material connections.

    a. Apply liquid flashing to all material joints and tool smooth.

    b. Apply liquid flashing in a serpentine fashion to the entire window opening and tool smooth to a minimum 25 mils wet film thickness. Spread material to cover the inside of rough openings and extend 4 inches onto adjacent surfaces. Create a slight positive slope towards the exterior of sill conditions by applying more material to the interior side of sills to create a taper towards the exterior while maintaining a minimum 25 mils wet film thickness.

    c. Apply liquid flashing to MEP penetrations with a maximum of ½ inch annular space. Extend liquid flashing a minimum 4 inches onto penetrating item and surrounding surfaces to a minimum of 25 mils dry film thickness.

    d. Apply liquid flashing to inside/outside corners and dissimilar material connections. Extend a minimum 4 inches onto adjacent surfaces a minimum of 4 inches and a minimum wet film thickness of 25 mils dry film thickness.

    e. Apply fluid-applied membrane air barrier onto liquid flashing a minimum of 2 inches.

E. THROUGH-WALL FLASHING MEMBRANE

1. Apply through-wall flashing membrane along the base of masonry veneer walls and over shelf angles as detailed.

    a. Prime surfaces and allow to dry, press membrane firmly into place, over lap minimum 2 inches at all end and side laps. Promptly roll all laps and membrane to ensure the seal.

    b. Applications shall form a continuous flashing membrane and shall extend up a minimum of 8 inches up the back-up wall.

    c. Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.

    d. Install through-wall flashing membrane and extend 1/2 inch from outside edge of veneer. Provide end dam flashing as detailed.

F. PRIMARY AIR BARRIER

1. Apply self-adhering air/vapor barrier membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

    a. Prime surfaces as per manufacturers' instructions and allow to dry.

b. Align and position self-adhering air/vapor barrier membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.

c. Roll all laps and membrane with a counter top roller to ensure seal.

d. At the end of each days work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel apply a feathered edge to seal termination and shed water.

3.04 FIELD QUALITY CONTROL

A. Make notification when sections of Work are complete to allow review prior to covering air/vapor barrier system.

3.05 INSTALLATION OF INSULATION

A. Coordinate with Ultra Wall Insulation and Air Barrier System Section 072113 for insulating materials.

B. Apply insulation adhesive in a serpentine pattern over the air barrier membrane.

1. Dab Method: Apply walnut-sized dabs of insulation adhesive spaced 6 inches on center to substrate. Apply insulation using sufficient hand pressure to compress dabs up to 2 inches in diameter.

2. Bead Method: Apply ¼ inch beads 6 inches on center in a serpentine pattern.

C. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.

3.06 PROTECTION

A. Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.

B. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

C. Air/vapor barrier membrane is not designed for permanent exposure. Good practice calls for covering as soon as possible.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 074293 – METAL FASCIA AND SOFFIT PANELS

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

A. Work included: Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of preformed metal fascia and soffit panels as indicated on the drawings including, but not limited to:

1. Preformed metal fascia panels.
2. Preformed metal soffit panels.
3. Preformed metal closure plates and channels.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 024119 – Selective Demolition
B. Section 054000 – Cold Formed Metal Framing
C. Section 079200 – Joint Sealants

1.04 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section and as listed in Section 014219.

B. Qualifications of Installers:

1. Throughout the progress of the work of this section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and direct all work performed under this section.

2. Provide adequate numbers of skilled workmen to ensure installation in strict accordance with the approved design.

1.05 SUBMISSIONS

A. General:

1. Comply with the requirements of Section 013300 – Submittal Procedures.

B. Manufacturer's Data:

1. Manufacturer's current specifications and other data required to demonstrate compliance with the specified requirements.

2. Manufacturer's recommended installation procedures.

3. Complete materials list of all items proposed to be furnished and installed under this section.

C. Shop Drawings:

1. Submit detailed shop drawings, with all dimensions, gauges of metal, and details of construction to include fastening methods, weatherproofing, and terminations of metal panel work.

D. Samples:

1. Submit three samples of each material utilized in the specified colors.

1.06 COORDINATION

A. All work of this section shall be properly coordinated with the work covered under other sections and contracts.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Materials shall be delivered to the job site in the manufacturer's original, unopened packages bearing the manufacturer's name, product name or title, and product description.

2. Delivery shall be made only after storage location has been determined.

B. Storage:

1. Store all materials in a single location approved by the Architect. Storage area is to be kept neat and clean. Any damage to storage area or its surroundings 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 storage area every night and take every precaution to avoid damage by fire.

C. Handling:

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 all other trades.

2. Position materials to allow for moisture run-off.

3. Do not place materials with strippable film in direct sunlight or extreme heat.

4. Care should be taken during handling of materials to prevent bending, twisting, abrasion, scratching, denting, etc.

1.08 REPLACEMENTS

A. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.09 GUARANTEES

A. Upon completion of the work of this section, and as a condition of its acceptance, deliver to the Owner a written guarantee, signed by the Contractor and installing Subcontractor, agreeing to repair or replace all defective work and all other work damaged in the event of failure from any cause other than a structural failure of the building or malicious damage, as outlined in Section

017000: Contract Closeout, without additional cost to the Owner.

B. A thirty (30) year paint finish guarantee from paint manufacturer with products coated with a fluoropolymer, 70% PVDF finish.

C. The above parties further agree to repair or replace all defective work at their own expense during the term of the guarantee.

PART 2 - PRODUCTS

2.01 GENERAL

A. Design is based on use of 'Metafor Fascia, Wind-lok Soffit Panels or Opaline Soffit Panels' as manufactured by Atas International, Inc. Corporate Headquarters: Allentown, PA 18106 Phone: (800) 468-1441 Website: www.atas.com Email: info@atas.com. The terminology used may include reference to that manufacturer's or to other 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.

B. Products used shall be those upon which design is based as noted on the drawings or shall be equal products approved in advance by the Architect.

C. Materials:

1. 'Metafor Fascia Panels' MFP120 or Architect approved equal.

    a. .040 aluminum.
    b. Smooth texture.
    c. 70% PVDF Standard finish or custom finish as selected by Architect.

2. 'Wind-lok Soffit Panels' MPV120 or Architect approved equal.

    a. .032 aluminum.
    b. 12" vented.
    c. 70% PVDF Standard finish or custom finish as selected by Architect.

3. 'Opaline Soffit Panels' OPF, OPN, OPM or OPW or Architect approved equal.

    a. .042 aluminum.
    b. Smooth texture.
    c. 70% PVDF Standard finish or custom finish as selected by Architect.

4. Closure Plates:

    a. 12 gauge aluminum.
    b. 70% PVDF Standard finish or custom finish as selected by Architect. Color to match fascia panels.

5. Closure Channels:

    a. .040 aluminum.
    b. 70% PVDF Standard finish or custom finish as selected by Architect. Color to match fascia and soffit panels.

6. Fasteners and spacing to be as per manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSPECTION

A. 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.

B. Report any interferences or unsatisfactory conditions to the Architect in writing. Do not proceed until interferences or unsatisfactory conditions have been removed or corrected.

3.02 INSTALLATION

A. Contractor must field verify all necessary dimensions prior to fabrication of metal panels and trims.

B. All panels and related components shall be installed plumb and true to line.

C. Do not allow panels or trim to come into contact with dissimilar materials which will cause a harmful reaction between the metals. Contact panel manufacturer for recommendations in regards to this matter.

D. Workmanship shall conform to standards set forth in the architectural sheet metal manual as published by SMACNA.

E. Touch-up only minor scratches and abrasions. Any other damaged material shall be replaced.

F. Each panel shall be checked for proper locking into the previous panel before next panel is installed.

G. All flashings and panel joints requiring caulking shall be applied neatly and to prevent water penetration.

H. Masking should be removed immediately after the installation of the panel and as the work progresses.

3.03 CLEAN-UP

A. Installer is to leave work areas and panels clean, free from grease, finger marks, and stains.

B. Remove scrap and debris from surrounding areas and grounds.

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 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. 2020 Building Code of New York State.
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 Veneer edge band over structural composite lumber.

6. Horizontal Edges: Structural composite lumber.

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 3/8 inch above thresholds.

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 084123 – FIRE RATED ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and General Provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Section apply to work in this section.

B. Section includes:

1. Fire rated glazing and framing systems for installation as sidelights, borrowed lights, windows, and transoms or wall sections in interior openings as indicated on the Construction Documents.

C. Related Sections include the following:

1. Section 051200 – Structural Steel Framing
2. Section 055000 – Metal Fabrications
3. Section 061000 – Rough Carpentry
4. Section 072113 – Ultra Wall Insulation and Air Barrier System
5. Section 072713 – Self-Adhered Non-Permeable Air Barrier Membrane
6. Section 078443 – Joint Firestopping
7. Section 079200 – Joint Sealants
8. Section 081113 – Hollow Metal Doors and Frames
9. Section 085113 – Aluminum Windows
10. Section 087100 – Door Hardware
11. Section 088813 – Fire Rated Glazing

1.02 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

1. AAMA 2603-2002 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
2. AAMA 2604 -2005 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2605 -2005 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):

1. Fire safety related:

a. ASTM E119: Methods for Fire Tests of Building Construction and Materials.

2. Material related:

a. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2007.
b. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2006b.

3. Exterior related:

    a. ASTM E 283-04: Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
    b. ASTM E 330-02: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference Procedure A.
    c. ASTM E 331-04: Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
    d. ASTM E 783-02: Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors.
    e. ASTM E 1105-00: Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.

C. American Welding Society (AWS)

1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007

D. Builders Hardware Manufacturers Association, Inc.

1. BHMA A156 - American National Standards for door hardware; 2006 (ANSI/BHMA A156).

E. Canadian Standards

1. CAN/ULC-S101 Standard Test of Fire Endurance Tests of Building Construction and Materials
2. CAN/ULC-S104 Standard Method of Fire Tests of Door Assemblies
3. CAN/ULC-S106 Standard Method of Fire Tests of Window and Glass Block Assemblies

F. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.
2. NFPA 251: Fire Tests of Building Construction & Materials
3. NFPA 252: Fire Tests of Door Assemblies
4. NFPA 257: Fire Test of Window Assemblies

G. Underwriters Laboratories, Inc. (UL):

1. UL 9: Fire Tests of Door Assemblies
2. UL 10 B: Fire Tests of Door Assemblies
3. UL 10 C: Positive Pressure Fire Tests of Window & Door Assemblies
4. UL 263: Fire tests of Building Construction and Materials
5. UL-752 Ratings of Bullet-Resistant Materials

H. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

I. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

J. American Society of Civil Engineers (ASCE)

1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures; 2005

1.03 PERFORMANCE REQUIREMENTS

A. System Description:

1. Steel fire-rated glazed wall and/or window system, dual aluminum cover cap format.

a. Face widths available:

1) 2”
2) Custom extruded aluminum cover caps
3) Custom stainless steel cover caps

2. Duration – Doors: Capable of providing a fire rating for 20, 45, 60, 90 minutes as indicated on the drawings.
3. Duration – Windows Capable of providing a fire rating for 45, 60, 120 minutes as indicated on the drawings.
4. Duration – Walls: Capable of providing a fire rating for 60, 120 minutes as indicated on the drawings.

B. Delegated design: For the performance requirements listed below requiring structural design provide data, calculations and drawings signed and sealed by an engineer licensed in the state where the project is located.

1. Structural Performance

a. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration.
b. Positive wind Load: as indicated on the drawings.
c. Negative wind Load: as indicated on the drawings.
d. Member deflection: Limit deflection of the edge of the glass normal to the plane of the glass to flexure limit of glass or 1/175 of the glass edge length or ¾ inch, whichever is less of any framing member.
e. Accommodate movement between storefront and adjoining systems.
f. Accommodate anticipated story drift.

C. Story Drift provide systems that accommodate the design displacement of adjacent stories as indicated on structural drawings as measured per AAMA 501.4.

D. Air Infiltration: ASTM E 283; Air infiltration rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 6.24 psf.

E. Water Resistance, (static): ASTM E 331; No leakage at a static air pressure differential of 15 psf as defined in AAMA 501.

1.04 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Product Data:

1. Technical Information: Submit latest edition of manufacturer’s product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.

C. Shop Drawings:

1. Include plans, elevations and details of product showing component dimensions; framed opening requirements, dimensions, tolerances, and attachment to structure.

2. Provide templates for the location of embeds and anchor locations required for any adjoining work.

D. Structural Calculations:

1. Provide structural calculations sealed by a licensed professional engineer in the State in which the project is located; prepared in compliance with referenced documents and these specifications.

E. Powder coat finish systems offered and provided by Technical Glass Products are manufactured by Tiger Drylac only.

F. Hardware schedule: List of manufacture supplied hardware and verification of cylinder size complying with Section 087100.

G. Samples for Initial Color Selection: For aluminum frames with factory-applied powder coat color finishes.

1. Triplicate copies of manufacturer's powder coating color charts showing the full range of colors available.

H. Verification Sample of selected finish on aluminum sample piece.

I. Samples: For following products:

1. Two 8-inch by 10-inch Glass sample-as provided by manufacturer.
2. Sample of frame.
3. Verification of sample of selected finish.

J. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

K. Technical Information: Submit latest edition of manufacturer’s product data providing product descriptions, technical data and installation instructions. Including blank warranty form.

L. Installer Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

M. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1. Separate certification will not be required for glazing materials bearing manufacturer’s permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

N. Field Quality-control reports

O. Maintenance Data

P. Warranties: Submit manufacturer's warranty and ensure that forms have been completed in the Owner's name and registered with the manufacturer.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252. Door assembly must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.

E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257 and UL 9.

F. Fire-Rated Wall Assemblies: Assemblies complying with ASTM E119 that are classified and labeled by UL, for fire ratings indicated, based on testing in accordance with UL 263, ASTM E119.

G. Certification: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

   1. Door assemblies shall be tested to the acceptance criteria of ASTM E2074-00, NFPA 252, UL 9, UL 10-C Standard Methods of Fire Tests of Door Assemblies.

   2. Window assemblies shall be tested to the acceptance criteria of ASTM E2010-01, NFPA 257, UL 10-B, UL 10-C Standard methods for Fire Tests of Window Assemblies.

   3. Wall assemblies shall be tested to the acceptance criteria of ASTM E119, NFPA 251, UL 263 Standard Test Methods for Fire Tests of Building Construction and Materials.

   4. Underwriters Laboratories (UL) shall conduct fire test.

H. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by an approved independent agency maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

I. Door assemblies shall be marked with the hourly rating followed by the letter "S". The letter "S" indicates air leakage resistance testing conformance to UBC 7-2 Parts I and II.

J. Window assemblies with ratings of less than 60 minutes may be tested in accordance with ASTM E2010-01, NFPA 257, UBC 7-4, UL 9, CAN4-S106 Standard Test Methods.

K. Regulatory Requirements: Comply with provisions of the following:
   1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities ANSI A117.1, as follows:

a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

b. Door Closers: Comply with the following maximum opening-force requirements indicated:

c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

2. NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.

b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

1.06 PRE-INSTALLATION MEETING

A. Conduct a pre-installation conference at least one week prior to the work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle under provisions specified by manufacturer.

1. At delivery inspect all containers for damage.
2. Examine glass and frame units for damage.
3. List all damage to containers on the shipping company's Bill of Lading.
4. Report damage to manufacturer immediately.
5. Store glazing materials and frame units in original packing containers.
6. Do not expose glazing material of frame units to sunlight and weather.
7. Do not store horizontally.
8. Place glass and frames upright, no less than 6 degrees from vertical.
9. Store all materials in dry conditions, off the ground.
10. Protect from construction activities.
11. Fully support Glass units along entire length.
12. Non-abrasive pads such as cloth or cork must separate glass and frame units.
13. Do not stack containers.

1.08 PROJECT CONDITIONS

A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.

1. Note whether field or planned dimensions were used in the creation of the shop drawings.

B. Coordinate the work of this section with others effected including but not limited to: other exterior envelope components and door hardware beyond that provided by this section.

1.09 WARRANTY

A. Provide the Pilkington Pyrostop® and Frame supplier's limited five-year warranty dated from substantial completion.

PART 2 – PRODUCTS

2.01 MANUFACTURERS - FIRE RATED WALL ASSEMBLY

A. Manufacturer Glazing Material: “Pilkington Pyrostop®” fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (425-396-8300) e-mail sales@fireglass.com, web site http://www.fireglass.com

B. Frame System: “Fireframes® Aluminum Series” fire-rated frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (425-396-8300) e-mail sales@fireglass.com web site http://www.fireglass.com

2.02 MATERIALS – GLASS

A. Low-E Coated glass for use in insulated exterior units See Section 088000.

B. Fire Rated Glazing: ASTM C 1036 and ASTM C 1048; composed of multiple sheets of Pilkington Optiwhite™ high visible light transmission glass laminated with an intumescent interlayer.

C. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

D. Properties Interior Glazing:

Fire-Rating	45 minute	60 minute		120 minute
Manufacturer’s designation	45-200	60-101	60-201	120-106
Glazing type	single	single	single	IGU
Nominal Thickness	3/4” (19mm)	7/8” (23mm)	1-1/16” (27mm)	2-1/4” (57mm)
Weight in lbs/sf	9.2	10.85	12.5	22.9
Daylight Transmission	86	87%	86%	75%
Sound Transmission Coefficient	40dB	41dB	44dB	46dB

E. Properties Exterior Glazing:

Fire-Rating	45 minute		60 minute		120 minute
Manufacturer’s designation	45-200	45-260 45-360	60-201	60-261 60-361*	120-262 120-362*
Glazing type	single	IGU	single	IGU	IGU
Nominal Thickness	3/4” (19mm)	1-5/16” (33mm)	1-1/16” (27mm)	1-5/8” (41mm)	2-3/8" (60mm) [with 14 mm spacer, or 2-1/8” (54 mm) with 8 mm spacer]
Weight in lbs/sf	9.2	12.5	12.5	15.8	22.1
Daylight Transmission	86	77 59-71	86%	77% 59-70%	74% 33-68%
Sound Transmission Coefficient	40dB	40dB	44dB	44dB	46dB

* Low-E product.

F. Exterior Grade: PVB inner layer installed toward exterior.

G. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.

H. Glazing Accessories: Manufacturer's standard compression gaskets, standoff, spacers, setting blocks and other accessories necessary for a complete installation.

2.03 MATERIALS –ALUMINUM FRAMING

A. Aluminum Framing System 45 min. 60 min. 120 min. as indicated on the drawings

1. Steel Frame — The steel framing members are made of two halves, nom. 1.9 in. wide (48.3 mm) with a nom. minimum depth of 1.38 in. (35 mm) with lengths cut according to glazing size.

2. Aluminum Trim — Supplied with the steel framing members. Nom. 2 in. (50.8 mm) wide with a nom. depth of 1.54 in. (39 mm) with lengths cut according to glazing size.

3. Stainless Steel Standoffs — Supplied with the steel framing members. Nom 5/16 in. (8 mm) diameter with a nom. minimum depth of 1 in. (25 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.

4. Stainless Steel Moment and Connecting Braces: — Supplied with the steel framing members. Nom 5/16 in. (8 mm) diameter with a nom. minimum depth of 1 in. (25 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.

5. Framing Member Fasteners — Supplied with the steel framing members. Screws are M6 x16mm Button Head Socket Cap Screws for frame assembly and #6 x 3/4" Pan Head Sheet Metal Screws for door installation.

6. Glazing Gasket:

a. Interior Gasketing-Supplied with the steel framing members. Nom. 3/4 in. (19 mm) x 3/16 (4.5 mm) black applied to the steel framing members to cushion and seal the glazing material when installed.

b. Exterior Gasketing- Supplied with the steel framing members. Nom. 2 in. (50 mm) x 3/16 (4.5 mm) black applied to the steel framing members to cushion and seal the glazing material when installed.

B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).

C. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M Standard Specification for Carbon Structural Steel.

2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.

2. Reinforce members as required to receive fastener threads.

2.04 ACCESSORIES

A. Fasteners: Use fasteners fabricated from Type 304 or Type 316 stainless steel.

B. Glazing Gaskets:

1. Glazing gaskets for interior or exterior applications: ASTM C 864 (extruded EPDM rubber that provides for silicone adhesion) or ASTM C1115 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories (extruded silicone).

C. Intumescent Tape: As supplied by frame manufacturer.

D. Setting Blocks: ¼" Calcium silicate.

E. Perimeter Anchors: Steel.

F. Flashings: As recommended by manufacturer; same material and finish as cover caps.

G. Silicone Sealant: One-Part Low Modulus, neutral cure High Movement-Capable Sealant: Type S; Grade NS; Class 25 with additional movement capability of 100 percent in extension and 50 percent in compression (total 150 percent); Use (Exposure) NT; Uses (Substrates) M, G, A, and O as applicable. (Use-O joint substrates include: Metal factory-coated with a high-performance coating; galvanized steel; ceramic tile.)

H. Intumescent Caulk: Single component, latex-based, intumescent caulk designed to stop passage of fire, smoke, and fumes through fire-rated separations; permanently flexible after cure; will not support mold growth; flame spread/smoke developed 10/10.

1. Available Products:
   a. 3M CP-25 WP+

2.05 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER INSULATION

A. Refer to Section 072114 – Mineral Board Insulation.

2.06 MATERIALS – DOORS

A. Manufacturer's standard single leaf and double leaf doors with manufacture's standard hardware; where indicated on the drawings.

B. Coordinate door hardware with cylinder specified in Section 087100 – Door Hardware.

2.07 FABRICATION

A. Obtain reviewed Shop Drawings prior to fabrication.

B. Fabrication Dimensions: Fabricate fire rated assembly to field dimensions.

C. Factory prepared, fire-rated steel door assemblies by TGP to be prehung, prefinished with hardware preinstalled for field mounting.

D. Field glaze door and frame assemblies.

2.08 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish frames after assembly.

C. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.09 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

1. Apply the specified finish to visible aluminum surfaces of all aluminum entrance assemblies. Apply a compatible and durable matching finish to visible fasteners or hardware.

2. Prepare the surfaces for finishing in accordance with recommendations of the aluminum producer and the finisher or processor for the specified finish.

3. Three coat process finish on doors and immediate or adjacent frames. Class I, Color Kynar Finish: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA2605. Color as selected by Architect from the full range of industry colors and color densities.

a. Primer coat: Kynar.

b. Kynar finish color coat:

1) Provide Fluoropolymer finish (Kynar 500) based laminated coating similar to "Duranar" (70% PVDF) by PPG Industries.

2) Color as indicated on the drawings or as selected and approved by Architect.

PART 3 – EXECUTION

3.01 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. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances. Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation.

B. Provide openings plumb, square and within allowable tolerances.

1. The manufacturer recommends 3/8 inch shim space at all walls.

C. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.

D. Do not proceed until such conditions are corrected.

3.02 INSTALLATION

A. Follow manufacturer's written instructions and reviewed shop drawings.

B. Install fully fire window, wall, and door in strict accordance with the approved shop drawings.

C. Set continuous sill members and flashing in full sealant bed to produce a watertight installation.

D. Install fire safing / fire stopping at edges of system.

E. Install glazing in strict accordance with fire resistant glazing material manufacturer's specifications. Field cutting or tampering is not permissible.

F. Do not install damaged frames or chipped glassing units.

G. Install plumb and true. Limit out of plumb or true to 1/8 inch in 10'-0" in any dimension.

3.03 REPAIR AND TOUCH UP

A. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.04 FIELD QUALITY CONTROL

A. Owner or will engage a qualified independent testing agency to perform field tests and inspections of entrance system.

3.05 PROTECTION AND CLEANING

A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface`. Remove nonpermanent labels, and clean surfaces.

1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.

2. Bullet resistant glazing materials employing PVB layer on exterior surface.

3. Protect surface applied film. Do not use any of the following:
   a. Steam jets.
   b. Abrasives.
   c. Strong acidic or alkaline detergents, or surface-reactive agents.
   d. Detergents not recommended in writing by the manufacturer.
   e. Do not use any detergent above 77 degrees F.
   f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
   g. Metal or hard parts of cleaning equipment must not touch the glass surface.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 086300 – METAL FRAMED SKYLIGHTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the following:

1. Metal Framed Structural Skylights

B. Related Documents:

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

C. Related Sections: The following sections contain requirements that relate to this section:

1. Section 051200 – Structural Steel Framing
2. Section 061000 – Rough Carpentry
3. Section 075216 – SBS Modified Bitumen Roofing
4. Section 075323 – EPDM Roofing System Fully Adhered
5. Section 075423 – TPO Roofing System Fully Adhered
6. Section 076000 – Flashing and Sheet Metal
7. Section 079200 – Joint Sealants
8. Section 088000 – Glazing

D. Refer to roofing system sections for roofing accessories to be built into the roofing system to accommodate work of this section.

1.02 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:

1. Deflection exceeding specified limits.
2. Thermal stresses transferred to the building structure.
3. Skylight framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
4. Weakening of fasteners, attachments, and other components.

B. Deflection Limits: As follows:

1. Deflection of the entire length of framing members in direction normal to glazing plane is limited to 1/175 of clear span.

C. Lateral Support: Compression flanges 75% of flexural members requiring lateral be laterally braced by cross members with minimum depths equal to flexural member depth and by anchors to the building structure. Glazing material does not provide lateral support.

D. Structural Loads: Provide metal-framed skylights, including anchorage, capable of withstanding the effects of the following design loads when supporting full dead loads:

1. Roof Loads

a. Concentrated Load: 300 lbs applied to framing members at location that produces the most severe stress or deflection.
b. Snow Load: As noted on the Drawings.
c. Roof Loads: As noted on the Drawings.
d. Wind Loads: As noted on the Drawings.

2. Seismic Loads: As noted on the Drawings.

E. Structural Performance: Provide metal-framed skylights, including anchorage, capable of withstanding pressures indicated without material and deflection failures and permanent deformation of structural members exceeding 0.2 percent of span when tested according to ASTM E 330.

F. Air Infiltration: Provide metal-framed skylights with maximum air leakage of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of surface when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24lb/sq. ft. (300 Pa).

G. Water Penetration: Provide metal-framed skylights that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 20 percent of positive design wind pressure, but not less than 15 lb/sq. ft. (718 Pa).

H. Condensation Resistance: Provide aluminum-framed systems that when tested with fixed glazing, have a frame condensation-resistance factor (CR) of not less than 46 when tested according to NFRC 500 when clear over clear insulated glass is used.

I. Thermal Movement: Provide metal-framed skylights that allow for thermal movements resulting from the following maximum change (range) in ambient temperatures by preventing buckling, sealant failure, and other detrimental effects.

1. Temperature Change (Range): 100 degrees F.

1.03 SUBMITTALS

A. General: Submit listed submittals in accordance with the Conditions of the Contract, and in conformance with Section 013300 – Submittal Procedures.

B. Product Data: Include construction details, material descriptions, dimensions and profiles of components, and finishes for metal-framed skylights.

C. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other work as required.

D. Samples for Initial Selection: Manufacturer’s color charts consisting of sections of units showing the full range of colors available for factory-finished aluminum.

E. Samples for Verification: Provide color sample of selected finish on 2"x3" aluminum sheet.

F. Installer Certificates: If required, signed by manufacturer certifying that installers comply with requirements.

G. Product Test Reports: From a qualified testing agency indicating skylights comply with requirements, based on comprehensive testing of current products.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to the manufacturer.

B. Professional Engineer Qualifications: A professional engineer who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of skylights that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

1.05 PROJECT CONDITIONS

A. Field Measurements: Where metal-framed skylights are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating skylights without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.06 WARRANTY

A. Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures.
2. Failure of systems to meet performance requirements.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation, resulting from defects in skylight materials or workmanship. (Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage). Water leakage resulting from improper installations not part of this warranty.

B. System Warranty Period: 5 years from date of shipment from the manufacturer.

C. Finish Warranty: Provide written warranty signed by manufacturer agreeing to repair or replace work with finish defects. “Defects” is defined as peeling, chipping, chalking, fading, abnormal aging or deterioration, and failure to perform as required.

1. Warranty Period for Kynar 500 Finish: 5 years from date of shipment from the manufacturer. (10 and 20 years available if specified).

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Manufacturers: Subject to compliance with requirements, provide Pinnacle 350/600 system by Wasco Products, Inc., Commercial Division, Wells, ME (800-388-0293), or Architect approved

equal.

B. Substitutions: Substitute manufacturers must have been in the custom skylight business for not less than a period of 15 years and must submit to the Architect the following:

1. List of similar projects successfully completed within the last five years.
2. Proof of financial capability.
3. Complete details of proposed skylight.
4. Complete specifications for Architect's review.

2.02 FRAMING MATERIALS

A. Framing Members: Extruded aluminum alloy 6063-T5 or T6, ASTM B 221 with minimum effective thickness of 0.109 inches.

B. Exterior Pressure Caps: Extruded aluminum alloy 6063-T5 or T6, ASTM B 221 with minimum effective thickness of 0.090 inches.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet alloy and temper of 1100-H14, thickness as require for proper performance.

1. Minimum Thickness: 0.032 inch Apron Flashing.
2. Minimum Thickness: 0.062 inch Closures.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories; compatible with adjacent materials.

1. Aluminum Retaining Cap Fasteners and Framing Members Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
2. Connections to Supporting Structure: Series 300 Stainless Steel or ASTM A 307, hot dipped galvanized steel fasteners by installer.

F. Framing-System Sealants: Single-component, non-sag, high performance, non-priming, gun-grade elastomeric polyurethane sealant furnished by skylight manufacturer.

1. Sealant complies with ASTM C920, Type S, Grade NS, Class 25, Use T, NT, M, A, G, and O. Canadian Specification CAN/CGSB-19.13-M87, Classification MCG-2-25-A-N.
2. Sealant conforms to USDA approval standards.

G. Bituminous Paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.

2.03 GLAZING MATERIALS

A. Sloped Glass: Refer to specification Section 088000 – Glazing.

1. Glass must meet the requirements of the AAMA Glass Design for Sloped Glazing for the project.

B. Glazing Gaskets: Manufacturer's proprietary pressure-glazing gaskets of elastomer type and hardness selected by the skylight manufacturer to comply with requirements. Glazing gaskets to be extruded thermoplastic elastomer by the skylight manufacturer.

C. Spacers, Edge Blocks, and Setting Blocks: Manufacturer's standard permanent non-migrating type of elastomer type and hardness selected to comply with requirements. Spacers, Edge Blocks, and Setting Blocks to be extruded thermoplastic elastomer by the skylight manufacturer.

D. Glazing Weatherseal Sealant: Neutral-curing silicone sealant recommended by skylight and sealant manufacturers for this use and furnished by skylight manufacturer.

1. Sealant is capable of withstanding 50 percent movement in both extension and compression (total of 100 percent movement) when tested for adhesion and cohesion under maximum cyclic movement according to ASTM C 719.
2. Sealant complies with ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to substrates including other sealants with which it comes in contact, O.
3. Color: Black.

E. Flashing Sealant: Single-component, non-sag, high performance, non-priming, gun-grade elastomeric polyurethane sealant furnished by skylight manufacturer.

1. Sealant complies with ASTM C920, Type S, Grade NS, Class 25, Use T, NT, M, A, G, and O. Canadian Specification CAN/CGSB-19.13-M87, Classification MCG-2-25-A-N.
2. Sealant conforms to USDA approval standards.

2.04 FABRICATION

A. Framing Components: As follows:

1. Factory fit and assemble components, where practical.
2. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
3. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
4. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
5. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
6. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
7. Fit and assemble components to greatest extent practicable before finishing.
8. Reinforce members as required to retain fastener threads.
9. Attach retainer bars with gasketed stainless steel fasteners spaced at a maximum of 12 inches on center.
10. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
11. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Provide continuous aluminum frame with weatherproof splice joints and locked and sealed or fully welded corners. Locate weep holes in the frame at each rafter connection to drain condensation.

C. Prepare framing to receive anchor and connection devices and fasteners.

D. Field Glazing: Locate and size extruded elastomeric setting blocks and spacers in accordance with the glazing manufacturer's recommendations. At no point shall the glazing come in contact with the skylight frame or fasteners.

2.05 ALUMINUM FINISHES

A. General: Comply with NAAMM “Metal Finishes Manual” recommendations for application and designations of finishes.

B. Finish designations prefixed by AA conform to the system for designations of aluminum finishes established by the Aluminum Association.

1. Kynar Fluoropolymer Two-Coat System: (70% PVDF) complying with AAMA 2605. Color: As Selected by Architect (3coat and 4 coat available).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting skylight performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Metal Protection: As follows:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.03 INSTALLATION

A. General: Comply with manufacturer’s written instructions for protecting, handling, and installing skylight components.

1. Fit frame joints to produce hairline joints free of burrs and distortion.
2. Rigidly secure non-movement joints.
3. Accommodate thermal and mechanical movements.
4. Install framing components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
5. Coordinate installation of flashings at skylight perimeters to maintain continuity of water barriers.
6. Set continuous curbs and flashings in a full sealant bed, unless otherwise indicated. Comply with requirements in Section 079200 – Joint Sealants.

B. Erection Tolerances: Install skylight components true in plane, accurately aligned, and without warp or rack. Adjust framing to comply with the following tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.

C. Field Glazing: Locate and size extruded elastomeric setting blocks and spacers in accordance with the glazing manufacturer's recommendations. At no point shall the glazing come in contact with the skylight frame or fasteners.

D. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.04 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.

1. Remove temporary protective coverings and strippable coatings from pre-finished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

3.05 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

B. Touch-up, repair or replace damaged products before 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 REFERENCES

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.

2.30 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.

3.03 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.

3.04 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.

3.05 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.

3.06 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:

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	L9071L 06N L283-711 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 TKTX		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	ND75JD RHO XN12-035 CHANGE LEVER TO MATCH EXISTING - CHANGE "JD" SUFFIX TO SUIT SFIC OR LFIC 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 TKTX		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 TKTX		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 L283-722 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 TKTX		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX		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 SECURITY	L9071L 06N L283-711 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 TKTX		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX		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 SECURITY	ND75JD RHO XN12-035 CHANGE LEVER TO MATCH EXISTING - CHANGE "JD" SUFFIX TO SUIT SFIC OR LFIC 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 TKTX		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 08 - GANG TOILET/CLASSROOM - AUTO OPERATOR - LOCKDOWN
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM SEC W/DB	L9457L 06N L283-711 CHANGE LEVER TO MATCH EXISTING		630	SCH
2	EA	MORTISE CYLINDER	TO MATCH EXISTING SYSTEM		626	
1	EA	ELECTRIC STRIKE	6216 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 TKTX OMIT AT CLASSROOM DOORS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX		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-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 08 – OPENINGS

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish and install glass and glazing work as shown on the drawings and as specified herein.

1. Glass and glazing units for the following products and applications, and glazing requirements referenced by other sections:

a. Annealed (float) glass.
b. Annealed laminated safety glass.
c. Tempered laminated safety glass.
d. Tempered (heat treated) glass.
e. Insulated glass.
f. Insulated reflective glass.
g. Insulated spandrel glass.
h. Skylight insulated glass.

B. The required applications of glass and glazing include (but are not necessarily limited to) the following:

1. Window units (fixed and operable sash).
2. Aluminum, steel, FRP, and wood doors (door lights, sidelights, and transoms).
3. Interior (borrowed light) windows.
4. Storefront and curtainwall framing systems.
5. Skylights.

C. Related Documents:

1. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

D. Related Sections include the following:

1. Section 072100 – Building Insulation
2. Section 079200 – Joint Sealants
3. Section 081113 – Hollow Metal Doors and Frames
4. Section 081416 – Flush Wood Doors
5. Section 081433 – Stile and Rail Doors
6. Section 084113 – Aluminum Entrances and Storefront
7. Section 084413 – Glazed Aluminum Curtain Walls
8. Section 085113 – Aluminum Windows
9. Section 085200 – Ultimate Double Hung Wood Windows

E. Insulated metal panels glazed into exterior aluminum window frames are specified in Section 085113 – Aluminum Windows.

1.02 REFERENCE STANDARDS

A. American National Standards Institute:

1. ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

B. ASCE 7 - "Minimum Design Loads for Buildings and Other Structures".

C. American Architectural Manufacturers Association:

1. AAMA 800 - Voluntary Specifications and Test Methods for Sealants.

D. Code of Federal Regulations:

1. 16FR 1201 – Safety Standards for Architectural Glazing Materials.

E. American Society for Testing and Materials (ASTM):

1. ASTM C 162 – Standard Terminology of Glass and Glass Products.
2. ASTM C 509 – Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
3. ASTM C 864 – Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
4. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants.
5. ASTM C 1036 – Standard Specification for Flat Glass.
6. ASTM C 1048 – Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
7. ASTM C 1087 – Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
8. ASTM C 1115 – Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
9. ASTM C 1172 – Standard Specification for Laminated Architectural Flat Glass.
10. ASTM C 1281 – Standard Specification for Preformed Tape Sealants for Glazing Applications.
11. ASTM C 1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
12. ASTM C 1376 – Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
13. ASTM E 774 – Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.
14. ASTM E 1300 – Standard Practice for Determining Load Resistance of Glass in Buildings.
15. ASTM E 2189 – Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.
16. ASTM E 2190 – Standard Specification for Insulating Glass Unit Performance and Evaluation.
17. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction & Materials.

F. Glass Association of North America (GANA):

1. Glazing Manual.
2. Laminated Glass Design Guide.
3. Engineering Standards Manual.

G. The Insulating Glass Manufacturers Alliance (IGMA):

1. IGMA TB-3001 - Sloped Glazing Guidelines.
2. IGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units.

H. Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; Building Technologies Department; Windows & Daylighting Group, windows.lbl.gov/software:

1. "LBNL Window 5.0 (or higher) - A PC Program for Analyzing Window Thermal and Optical Performance.

I. National Fenestration Rating Council (NFRC):

1. NFRC 100 - Procedure for Determining Fenestration Product Thermal Properties.
2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.
3. NFRC 300 - Procedures for Determining Solar Optical Properties of Simple Fenestration Products.

J. National Fire Protection Association (NFPA):

1. NFPA 80 - Fire Doors and Windows.
2. NFPA 252 - Fire Tests of Door Assemblies.
3. NFPA 257 - Fire Test for Window and Glass Block Assemblies.

K. Safety Glazing Certifications Council (SGCC):

1. SGCC – Certified Products Directory for Safety Glazing Material Used in Buildings.

L. Associated Laboratories, Inc. (ALI):

1. ALI – Certified Products Directory – Fenestration Products.

M. Federal Specifications (FS):

1. FS TT-S-230A – Sealing Compound, Synthetic Rubber Base, Single Component, Chemically Curing for Caulking, Sealing and Glazing in Building Construction.
2. FS TT-S-002303 – Sealing Compound, Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).

1.03 SUBMISSIONS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Product Data - Glazing Materials:

1. Submit manufacturer's product data, specifications, and installation instructions for each type glass, glazing material and associated/ related products. Include test data substantiating that glass complies with specified requirements. Include documentation of compatibility of sealants with glazing products, and instructions for handling, storing, installation and recommended procedures for cleaning of each type of glass and glazing material.

C. Samples: Prior to the delivery of materials, submit to the Architect samples of each of the following:

1. Submit three (3) 12" square samples of each type of glass required. Architect's review of samples will be for color, texture, and pattern only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

2. Submit three (3) beads, approximately ¼-inch wide by 3 inches long, of each sealant to be employed, indicating color of set or cured material.

D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

F. Qualification Data: For installers.

G. Product Test Reports: For each of the following types of glazing products.

1. Tinted float glass.
2. Coated float glass.
3. Insulating glass.

H. Shop Drawings: Prior to placement of glass order or glass fabrication, the Contractor shall submit pertinent shop drawings (i.e. – windows, doors, borrowed light frames, etc.) which have been:

1. Checked and approved by the General Contractor, stamped and dated.
2. Reviewed by the Architect, with stamp affixed.

I. Warranties: Special warranties specified in this Section.

1.04 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or other specified gas.

D. Sealed Insulating Glass Unit Surface Designations:

1. Surface 1: Exterior surface of outer glass lite.
2. Surface 2: Interspace surface of outer glass lite.
3. Surface 3: Interspace surface of inner glass lite.
4. Surface 4: Interior surface of inner glass lite.

E. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

F. Manufacturing defects are defined as edge separation, seal failure, delamination, core cracking, loss of visibility/clarity due dusting or misting, or UV exposure, or chemical reaction to glass cleaners.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of glass products, types as specified, with minimum documented five years experience.

1. For glass sputter-coated with solar-control low-e coatings, obtain glass products in fabricated units from a manufacturer/fabricator certified by the primary glass manufacturer.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level-2 (Senior Glaziers) or Level-3 (Master Glaziers).

C. Single Source Responsibility: Obtain materials from one source for each type of glass and glazing.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and industry organizations, including but not limited to those below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. FGIA Publication for Insulating Glass: SFGIA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
2. NGA Publications: “Laminated Glazing Reference Manual”; “Glazing Manual.”
3. AAMA: “Sloped Glazing Guidelines.”
4. FGIA: “Guidelines for Sloped Glazing.”

F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.
3. Fenestration and Glazing Industry Alliance.

G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 for Category I and II glazing products and, Fenestration and Glazing Industry Alliance ANSI Z97.1.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
2. Lites more than 9 sq ft (0.84 sq m) in area are required to be Category II materials.
3. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sf (0.84 sq m) in area, provide glazing products that comply with Category II materials, and for lites 9 sf (0.84 sq m) or less in area, provide glazing products that comply with Category I or II materials.

H. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

    a. Perform tests under normal environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each

type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

I. Glazing for Fire-Rated Door and Window Assemblies: Glazing tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labeled per requirements of authorities having jurisdiction.

1.06 REGULATORY REQUIREMENTS

A. Comply with applicable provisions of all codes and standards acceptable to local, state and federal agencies having jurisdiction.

B. Perform Work in accordance with the following Glazing Standards:

1. Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual".

2. Safety Glazing: Comply with size, glazing type, location, and testing requirements of 16 CFR 1201 for Category I and II glazing products, and requirements of authorities having jurisdiction.

3. Insulating Glass: Provide insulating glass units permanently marked either on spacers or on at least one pane with appropriate certification label of Insulating Glass Certification Council (IGCC) or Associated Laboratories, Inc. (ALI).

1.07 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: Provide glazing capable of withstanding wind-load design pressures calculated according to requirements of the 2020 International Building Code or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.5, "Method 2 - Analytical Procedure," whichever are more stringent. Refer to drawings for Wind Design Data.
b. Specified Design Snow Loads: As indicated on Drawings, but not less than snow loads

applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."

c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set within 15 degrees of vertical.

1) Wind Load Duration: Short duration, as defined in ASTM E 1300 or 60 seconds or less.

d. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical.

1) Wind Load Duration: Short duration, as defined in ASTM E 1300 or 60 seconds or less.
2) Snow Load Duration: Long Duration, as defined in ASTM E 1300 or 30 days.

e. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

1) For monolithic-glass lites heat treated to resist wind loads.
2) For insulating glass.

f. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1/4 inch (6.0 mm) thick.

2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.

3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:

a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. per h per degree F.
b. Solar Heat Gain Coefficient: NFRC 200.
c. Solar Optical Properties: NFRC 300.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Delivery:

1. Delivered materials shall match the approved samples.

2. Each panel of glass shall be factory labeled. Deliver glass with manufacturer's labels intact.

3. Packaged materials shall be delivered in the original unopened labeled containers of the manufacturer, clearly marked with their name and brand.

C. Storage and Handling:

1. Store glass in designated areas, while awaiting installation, in a dry, well-ventilated location at a constant temperature maintained above dew point away from traffic and construction.

2. Do not remove labels until glass has been installed.

3. Keep glass free from contamination by materials capable of staining or damaging glass.

4. Glass that is cracked, broken, chipped, or otherwise damaged during transportation, storage, and erection (including natural causes, accidents, and vandalism) and unfit for use shall be removed from the job site and replaced with acceptable materials at the Contractor's expense.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Perform glazing only when ambient temperature is above 40 degrees

B. When circumstances require glazing below 45 degrees F, steps shall be taken to assure dry and frost-free surfaces, as approved by the Architect.

1.10 WARRANTY

A. Manufacturer's Warranty for Coated-Glass Products: Manufacturer's standard form, made out to the glass fabricator in which the coated glass manufacturer agrees to replace coated glass units that deteriorates during normal use within the specified warranty period. Deterioration of the coated glass is defined as peeling and/or cracking, or discoloration that is not attributed to glass breakage, seal failure, improper installation, or cleaning and maintenance that is contrary to the manufacturer's written instructions.

1. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Warranty on Insulating Glass: Manufacturer's standard form in which the insulating glass unit manufacturer agrees to replace insulating-glass units that deteriorate during normal use within the specified warranty period. Deterioration of insulating glass units is defined as an obstruction of vision by dust, moisture, or a film on the interior surfaces of the glass caused by a failure of the hermetic seal that is not attributed to glass breakage, improper installation, or cleaning and maintenance that is contrary to the manufacturer's written instructions.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Warranty on Laminated Glass: Manufacturer's standard form in which the laminated glass manufacturer agrees to replace laminated glass units that deteriorate during normal use within the specified warranty period. Deterioration of laminated glass is defined as defects, such as discoloration, edge separation, or blemishes exceeding those allowed by ASTM C 1172 that are not attributed to glass breakage, improper installation, or cleaning and maintenance that is contrary to the manufacturer's written instructions.

1. Warranty Period: Five years from date of Substantial Completion.

D. Installer's Warranty: Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing

products due to faulty installation, within 2 years of date of manufacture.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements, provide products by one of the following:

A. Glass Products:

1. Manufacturers producing glass complying with the requirements include the following:

a. Vitro Architectural Glass, Glass Technology Center, 400 Guys Run Rd., Cheswick, PA 15024, (855)-887-6457, Fax: (800) 367-2986.
Email:archservices@vitro.com, http://www.vitroglazings.com

b. Guardian Glass, Auburn Hills, MI.

c. AGC Inc., Kingsport, TN.

d. Custom Glass Co., Pittsburgh, PA.

2.02 MATERIALS

A. General:

1. All glass, whether specifically shown or specified, shall conform to manufacturer's standards as to maximum size for each type of glass.

B. Annealed Float Glass, General: ASTM C 1036, Type I, Quality-Q3, class indicated.

C. Heat-Treated Float Glass, Heat-Strengthened: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; Kind HS, of class and condition indicated: where indicated, where needed to resist thermal stresses and where required to comply with performance requirements.

D. Heat-Treated Float Glass, Fully Tempered: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; Kind FT, of class and condition indicated: where safety glass is indicated. Safety glazing must comply with ANSI Z97.1 and CPSC 16CFR-1201.

E. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during primary glass product manufacture.

F. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process following primary glass product manufacture.

G. Coated Spandrel Float Glass: Float glass complying with ASTM C 1048, GANA 'Engineering Standards Manual' 89-1-6 Specification for Environmental Durability of Fully Tempered or Heat-Strengthened Spandrel Glass with Applied Opacifier and other requirements specified, with manufacturer’s standard opacifier material on coated second surface of lites.

H. Laminated Glass: ASTM C 1172, with manufacturer’s standard polyvinyl butyral or cured resin interlayer.

I. Insulating-Glass Units: Factory-assembled units consisting of dual-sealed lites of glass separated by a dehydrated interspace, with manufacturer’s standard spacer material and construction, per

ASTM E 2190.

2.03 FABRICATION OF GLAZING UNITS, GENERAL

A. Fabricate glazing units in dimensions required, with edge and face clearances, edge and surface conditions, and bite in accordance with glazing product manufacturer/fabricator's instructions and referenced glazing publications.

2.04 GLASS PRODUCTS

A. **One-quarter inch (1/4") Annealed Float Glass**:

1. General:

a. Float glass is glass which has been floated on molten tin and annealed slowly to produce a transparent flat glass which eliminates grinding or polishing.

b. ASTM C 1036, Type I, Quality-Q3, class 1.

c. CPSC 16 CFR 1201, safety regulation for architectural glazing in hazardous locations; 1/4-inch thick.

B. **One-quarter inch (1/4") Heat-Treated Safety Glass:**

1. General:

a. ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I (transparent flat), Class 1 (clear), Quality q3 (glazing select).

b. ANSI Z97.1 and CPSC 16CFR-1201, safety regulation for architectural glazing in hazardous locations; 1/4-inch thick.

C. **Laminated Safety Glass**:

1. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

a. ASTM C1172, Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2. **One-quarter inch (1/4") Safety Laminated, Polished Plate Glass**:

a. A 0.015" thick plastic (interlayer) film sandwiched between two layers of 1/8" annealed float glass.

b. CPSC 16CFR-1201, safety regulation for architectural glazing in hazardous locations; 1/4-inch thick. Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified.

c. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

1) Interlayer Material: Polyvinyl butyral sheets or cured resin.

3. **One-half inch (1/2") Tempered Laminated Safety Glass**:

   a. Formed of two pieces of ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I (transparent), Class 1, Quality q3 (glazing select), glass 1/4-inch thick laminated together with a clear 0.015 inch thick PVB interlayer, for a 1/2-inch total nominal thickness.

   b. CPSC 16CFR-1201, safety regulation for architectural glazing in hazardous locations.

D. **One-quarter inch (1/4") Tempered Glass**:

1. General:

   a. Float glass which has been heat treated and rapidly cooled to produce compressively stressed surface layer resulting in a strength of at least four to five times that of annealed glass and complying with strength requirements of FS-DD-G-1403B for Grade B, Tempered Glass.

   b. CPSC 16CFR-1201, safety regulation for architectural glazing in hazardous locations; when used in a dual glazed unit 1/4" thick.

2.05 INSULATING GLASS UNITS

A. **One Inch (1") Insulated Glass**:

1. General:

   a. Factory-assembled units consisting of dual-sealed lites of glass separated by a dehydrated interspace, with manufacturer's standard spacer material and construction, per ASTM E 2190.

   b. All insulating glass units, whether specifically shown or specified, shall conform to the manufacturer's standards as to maximum size for each type of glass.

   c. Fabricate glazing units in dimensions required, with edge and face clearances, edge and surface conditions, and bite in accordance with glazing product manufacturer/fabricator's instructions and referenced glazing publications.

2. **High Performance Insulating Glass**: Formed of two 1/4-inch lites of glass separated by a 1/2-inch Argon Gas filled space hermetically sealed, for a total 1 inch nominal thickness conforming to ASTM E 2190, consisting of:

   a. Outer Lite: ASTM C1036, Type I, Class 1 (tint - color as selected by architect), Quality q3.

      1) Kind FT (Full Tempered)
      2) 1/4-inch thick glass.
      3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C 1376.
      4) Coating: "Solarban" 70 Solar Control Low-E (Sputtered) by Vitro Architectural Glass on the second surface (2).

   b. Interspace Content: Air (10%) / Argon (90%) Mix 1/2" (12.7mm).

   c. Inside Lite: ASTM C1036, Type I, Class 1 (clear), Quality q3.

      1) Kind FT (Full Tempered)
      2) 1/4-inch thick glass.

d. Performance Requirements: (minimum requirements based on non-tinted clear glass)

1) Visible Light Transmittance: 64 percent minimum.
2) Winter Nighttime U-Factor: 0.24 (Btu/hr*ft^2*°F) maximum.
3) Summer daytime U-Factor: 0.21 (Btu/hr*ft^2*°F) maximum.
4) Shading Coefficient: 0.31 maximum.
5) Solar Heat Gain Coefficient: 0.27 maximum.
6) Outdoor Visible Light Reflectance: 13 percent maximum.

3. **High Performance Reflective Insulating Glass**: Formed of two 1/4-inch lites of glass separated by a 1/2-inch Argon Gas filled space hermetically sealed, for a total 1 inch nominal thickness conforming to ASTM E 2190, consisting of:

a. Outer Lite: ASTM C1036, Type I, Class 1 (tint - color as selected by architect), Quality q3.

1) Kind FT (Full Tempered)
2) 1/4-inch thick glass.
3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C 1376.
4) Coating: “Solarcool” by Vitro Architectural Glass on second surface (2).

b. Interspace Content: Air (10%) / Argon (90%) Mix 1/2" (12.7mm).

c. Inside Lite: ASTM C1036, Type I, Class 1 (clear), Quality q3.

1) Kind FT (Full Tempered)
2) 1/4-inch thick glass.
3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C 1376
4) Coating: “Solarban” 70 Solar Control Low-E (Sputtered) by Vitro Architectural Glass on the third surface (3).

d. Performance Requirements: (minimum requirements based on Solarbronze glass)

1) Visible Light Transmittance: 17 percent minimum.
2) Winter Nighttime U-Factor: 0.24 (Btu/hr*ft^2*°F) maximum.
3) Summer daytime U-Factor: 0.22 (Btu/hr*ft^2*°F) maximum.
4) Shading Coefficient: 0.20 maximum.
5) Solar Heat Gain Coefficient: 0.17 maximum.
6) Outdoor Visible Light Reflectance: 14 percent maximum.

4. **High Performance Spandrel Insulating Glass**: Formed of two 1/4-inch lites of glass separated by a 1/2-inch Argon Gas filled space hermetically sealed, for a total 1 inch nominal thickness conforming to ASTM E 2190, consisting of:

a. Outer Lite: ASTM C1036, Type I, Class 1 (tint - color as selected by architect), Quality q3.

1) Kind FT (Full Tempered)
2) 1/4-inch thick glass.
3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C 1376.
4) Coating: “Solarban” 70 Solar Control Low-E (Sputtered) by Vitro Architectural Glass on the second surface (2).

b. Inside Lite: ASTM C1036, Type I, Class 1 (clear), Quality q3.

1) Kind FT (Full Tempered)
2) 1/4-inch thick glass.
3) Monolithic coating on the fourth surface (4), provide coating on the third surface (3)

when glazing is exposed to the inside.

4) Coating: “OPACI-COAT 300” by ICD High Performance Coatings, 7350 South Union Ridge Parkway, Ridgefield WA 98642. 360.546.2286 phone - 360.546.2287 fax; icd@icdcoatings.com; http://www.icdcoatings.com/

c. Performance Requirements: (minimum requirements based on non-tinted clear glass)

1) Visible Light Transmittance: 64 percent minimum.
2) Winter Nighttime U-Factor: 0.24 (Btu/hr*ft^2*°F) maximum.
3) Summer daytime U-Factor: 0.21 (Btu/hr*ft^2*°F) maximum.

5. **High Performance Insulating Skylight Glass**: (to be used at all glass skylights and horizontal glass applications) Formed of one 1/4-inch lite of tempered glass and one 5/16-inch inch lite of laminated glass separated by a 1/2-inch Argon Gas filled space hermetically sealed, for a total 1-3/16 inch nominal thickness conforming to ASTM E 2190, consisting of:

a. Outer Lite: ASTM C1036, Type I, Class 1 (tint - color as selected by architect when required), Quality q3.

1) Kind FT (Full Tempered)
2) 1/4-inch thick glass.
3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C 1376.
4) Coating: “Solarban” 70 Solar Control Low-E (Sputtered) by Vitro Architectural Glass on the second surface (2).

b. Indoor Lite: Laminate: ASTM C1172 and complying with testing requirements.

1) Laminate Outboard Lite: ASTM C1036, Type I (transparent), Class 1 (clear), Quality q3.

a) Kind FT (Full Tempered)
b) 1/4-inch thick glass.

2) Interlayer: ASTM C1036, Type I, Class 1, Quality q3.

a) Type: PVB
b) Thickness: 0.015” (0.38mm)”

3) Laminate Inboard Lite: ASTM C1036, Type I (transparent), Class 1 (clear), Quality q3.

a) Kind FT (Full Tempered)
b) 1/4-inch thick glass.

c. Performance Requirements: (minimum requirements based on non-tinted clear glass)

1) Visible Light Transmittance: 58 percent minimum.
2) Winter Nighttime U-Factor: 0.22 (Btu/hr*ft^2*°F) maximum.
3) Summer daytime U-Factor: 0.14 (Btu/hr*ft^2*°F) maximum.
4) Shading Coefficient: 0.30 maximum.
5) Solar Heat Gain Coefficient: 0.26 maximum.
6) Outdoor Visible Light Reflectance: 13 percent maximum.

2.06 GLAZING MATERIALS AND ACCESSORIES

A. General:

1. Provide black exposed glazing materials, unless another color is indicated, or unless another color is selected by the Architect from manufacturer's standard colors. Provide hardness of materials as recommended for the required application and condition of installation in each case. Provide only compounds, which are known (proven) to be fully compatible with surface contacted.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Glazing Tape: Butyl-based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation, complying with ASTM C 1281 and AAMA 800 for application.

D. Glazing Gaskets:

1. Dense Compression Gaskets: ASTM C 864, neoprene or EPDM, or ASTM C 1115, silicone or thermoplastic polyolefin rubber, as recommended by glazing product manufacturer for application, molded or extruded shape to fit glazing channel retaining slot; black color.

2. Soft Compression Gaskets: ASTM C 509, Type II, black, molded or extruded, neoprene, EPDM, silicone or thermoplastic polyolefin rubber, of profile and hardness required to maintain watertight seal.

E. Setting Blocks: ASTM C 864, neoprene, 80 to 90 Shore A durometer hardness; length 4 inches, width of glazing rabbet space less 1/16 inch, height required for glazing method, pane weight, and pane area.

F. Spacer Shims: ASTM C 864, neoprene, 50 to 60 Shore A durometer hardness; length 3 inches, one half height of glazing stop, thickness required for application, one face self-adhesive.

G. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

H. Glazing Sealants: ASTM C 920, type recommended by glazing product manufacturer for application indicated, complying with requirements of Section 079200 – Joint Sealants, color as selected by Architect.

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.

4. For Glazing Interior Openings:

a. Acrylic latex one-part terpolymer (FS TT-00230) or acrylic latex emulsion (ASTM C-834), compounded specifically as glazing sealant with permanent flexibility (non-hardening), non-staining, and non-bleeding.

b. Products complying with these requirements include:

1) "AC-20" by Pecora Corp., Harleysville, Pennsylvania.
2) "MONO" by Tremco, Inc., Cleveland, Ohio.
3) "Krylflex" by Chem-Masters Corp., Chagrin Falls, Ohio.

5. For Glazing Exterior Openings, except where gasket is used:

   a. Silicone sealant, complying with FS TT-S-001543, Class A, non-sag, compounded for glazing applications.

   b. Products complying with these requirements include:

      1) "Dow Corning 999 Silicone Building and Glazing Sealant" by Dow Corning Corp., Midland, Michigan.

      2) "Silicone Construction Sealant 1200" by General Electric Co., Silicone Products Div., Waterford, New York.

6. For Glazing Glass to Glass:

   a. Structural Silicone sealant, complying with ASTM C1401-09a, Standard Guide for Structural Sealant Glazing.

   b. Products complying with these requirements include:

      1) "Dow Corning 993 Structural Glazing Silicone Sealant" by Dow Corning Corp., Midland, Michigan.
      2) "Dow Corning 3362 Insulating Glass Silicone Sealant" by Dow Corning Corp., Midland, Michigan.

I. Compressible Filler Rod:

   1. Closed cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that glazing channels are clean, free of burrs, irregularities, and debris and ready to accept glazing installation, and that weeps are unobstructed. Confirm that minimum required face and edge clearances will be maintained.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Examine glazing units prior to setting. Reject units that display edge or face damage that may impede performance of unit or that will be visible when installed.

3.02 PREPARATION

A. Field Measurements:

   1. Cut glass accurately to sizes obtained from actual verified field measurements of frames to receive glass.

2. Allow for proper edge clearances.

B. Preparation of Surfaces:

1. Remove any protective coatings or covering from surfaces to be glazed.

2. Clean glass and glazing surfaces to remove dust, oil and contaminants, and wipe dry.

3. Clean glazing channels and other framing members receiving glass immediately before glazing with recommended solvent and wipe dry. Remove coatings not firmly bonded to substrates.

4. Apply primers to joint surfaces to ensure adhesion of sealants, unless preconstruction sealant-substrate testing indicates no primer is required.

3.03 GENERAL PROVISIONS

A. Exterior Glazing Only:

1. Watertight and airtight installation of each piece of glass is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss of breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

2. Weather conditions:

a. Do not proceed with installation of liquid sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended limitations for installation.

B. Interior and Exterior glazing:

1. Protect glass from edge damage at all times during handling, installation, and operation of the building.

2. Glazing channel dimensions as shown are intended to provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thickness, with reasonable tolerances. The installer is responsible for correct glass size for each opening, within the tolerances and necessary dimensions established.

3. The installer must examine the framing or glazing channel surfaces, backing, stop design, and the conditions under which the glazing is to be performed, and notify the Prime Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the glazing until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.04 GLAZING INSTALLATION

A. Verify by measurements at the job site all dimensions affecting this work.

B. Comply with combined recommendations of glass manufacturer and manufacturer of sealants, gaskets, and other materials used in glazing, except where more stringent requirements are shown or specified, and except where manufacturers' technical representatives direct otherwise.

C. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust

as required by Project conditions during installation. Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coating which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.

D. Do not attempt to cut, seam, nip, or abrade glass that is tempered, heat strengthened, or coated.

E. Inspect each piece of glass immediately before installation, and eliminate any which have observable edge damage or face imperfections. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

F. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

G. Glass shall be set without springing or forcing and carefully centered laterally and vertically so as to provide uniform clearance. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

H. Install glass and glazing materials in accordance with instructions of manufacturers and requirements of GANA Glazing Manual.

1. Install setting blocks of proper sizes at quarter points of sill rabbet. Set blocks in thin course of heelbead compound / sealant, if any.

2. Provide spacers inside and out, and of proper size and spacing, for all glass sizes where the length plus width is larger than 50 united inches, except where gaskets are used for glazing.

3. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

4. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

5. Ensure that glazing units are set with proper and consistent orientation of glass units toward interior and exterior.

6. Provide edge blocking where recommended.

7. Install sealants in accordance with requirements of Section 079200 – Joint Sealants.

8. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, drawn, and bow oriented in the same direction as other pieces.

9. Clearance Requirements: Allow the following minimum nominal clearances, in accordance with glass manufacturer's recommendations; glass face to channel face, glass edge to frame member, and glass bite:

Glass Thickness	Face Clearance	Edge Clearance	Bite
Up to 1/4 - inch	1/8 - inch	1/4 - inch	1/4 - to 3/8-inch
5/16 - to 3/8-inch	3/16 - inch	5/16 - inch	5/16 - to 7/16-inch
1/2 - to 13/16-inch	1/4 - inch	3/8 - inch	1/2 - to 5/8-inch
7/8 - inch and over	1/4 - inch	1/2 - inch	1/2 - to 7/8-inch

3.05 GLASS TO GLASS JOINTS

A. Where glass panels join without mullion, bed joint with clear silicone sealing compound. For exterior applications a structural silicone bond joint is required. All materials to be joined must be compatible and meet the sealant manufacturer's requirements for adhesion & design loading.

B. Edgework requirements for butt joint glazing applications shall be reviewed and approved by the architect prior to field installation due to a variation in edge quality based on the size, shape and thickness of the glass.

C. Factory clean cut edges shall meet the following recommendations for butt joint glazing applications:

1. 3/8" glass is acceptable for use with factory clean cut edges.
2. 1/2" glass up to a maximum length of 100" on the butt joint edge can be used with factory clean cut edges.
3. 1/2" glass over 100" in length and 5/8" and thicker glass in any length should not be used with a factory clean cut edge.

3.06 SEALANT APPLICATION

A. Force sealants into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

B. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from the glass. Install pressurized tapes and gaskets to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.

C. Clean and trim excess glazing materials from the glass and stops or frames promptly after installation, and eliminate stains and discolorations.

D. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

3.07 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.08 EXTERIOR COMBINATION METHOD (TAPE AND SEALANT)

A. Cut glazing tape to proper lengths prior to application, install against permanent stop, 3/16-inch to 1/4-inch below sightline.

B. Do not lap the adjoining lengths of tape or rubber shim, as this will prevent full contact around perimeter of glass:

1. Strips must be installed in four separate sections, not run continuously around corners.

C. Place setting blocks at 1/4 points.

D. Rest glass on setting blocks and press against tape with sufficient pressure to ensure full contact and adhesion at perimeter.

E. Install removable stops; insert continuous spacer strips between glass and applied stop to keep glass in compression against the tape.

1. Install in four separate sections.

F. Sealant cavity pocket, formed by setting of the applied stop, shall then be filled to the sight line with sealant.

G. Cap bead shall not exceed 1/16 inch above sight line onto glass surface.

H. Tool or wipe cap bead with solvent for smooth appearance.

3.09 INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and install against permanent stop, projecting 1/16-inch above sightline.

B. Place setting blocks at 1/4 points.

C. Rest glass on setting blocks and push against stop for full contact and adhesion at perimeter.

D. Place glazing tape on free perimeter of glass in same manner described above.

E. Install removable stop, avoid displacement of tape, exert pressure on tape for full continuous contact.

F. Knife trim excess or protruding tape.

3.10 CLEANING AND PROTECTION

A. Protect exterior glass from breakage immediately upon installation by attachment of crossed streamers to framing held away from glass. DO NOT APPLY MARKERS OF ANY TYPE TO SURFACES OF GLASS. Remove nonpermanent labels, and clean surfaces.

B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in any other way during the construction period, including natural causes, accidents, and vandalism. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Remove all excess glazing material from all installed glass. Maintain glass in a reasonably clean condition during construction, so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other surfaces. Any soiling occurring on the glass shall be promptly and completely washed off.

D. Carefully and completely remove all markings and labels from glass surfaces. Do not apply markers to glass surfaces.

E. Wash and polish glass on both faces with a mild neutral or slightly acidic solution as recommended by the glass manufacturer not more than four days prior to Owner's acceptance of the work in each area. Attach crossed streamers away from glass face.

F. Care shall be taken during cleaning to avoid scratching of glass surfaces by grit particles.

G. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

H. Within 5 working days prior to inspection for Substantial Completion, clean all exposed glass surfaces using methods recommended by manufacturer. Remove glazing compounds from framing surfaces.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 088813 – FIRE RATED GLAZING

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 WORK INCLUDED

A. Fire-rated glazing materials installed as vision lights in fire-rated doors.

B. Fire-rated glazing materials installed as transoms, borrowed lites and windows in fire-rated frames.

C. For non-rated assemblies, see Specification Section 088000 – Glazing.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 079200 – Joint Sealants
B. Section 081113 – Hollow Metal Doors and Frames
C. Section 081416 – Flush Wood Doors
D. Section 081433 – Stile and Rail Doors

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. ASTM E2010-01 – Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
2. ASTM E2074-00 – Standard Test Method for Fire Tests of Door Assemblies, including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
3. ASTM E163 – Methods for Fire Tests of Window Assemblies.
4. ASTM E773 – Test Method for Seal Durability of Sealed Insulating Glass Units.
5. ASTM E838 – Cracking, Blistering, Crazing and Color Change.
6. ASTM E 119 – Fire Tests of Building Construction and Materials.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1 – Standard for Safety Glazing Materials Used in Buildings

C. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201 – Safety Standard for Architectural Glazing Materials

D. Glass Association of North America (GANA):

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

E. National Fire Protection Association (NFPA):

1. NFPA 80 – Fire Doors and Windows.

2. NFPA 252 – Fire Tests of Door Assemblies.
3. NFPA 257 – Fire Tests of Window Assemblies.

F. Underwriters Laboratories, Inc. (UL):

1. UL 9 – Fire Tests of Window Assemblies.
2. UL 10B – Fire Tests of Door Assemblies.
3. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

G. Building Code of New York State

1.05 PERFORMANCE REQUIREMENTS

A. FireLite Plus® - Fire-rated glass ceramic laminated clear and wireless glazing material for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements ranging from 20 minutes to 3 hours with hose stream test.

B. Fireglass20® - Fire-rated tempered glass clear and wireless glazing material for use in impact safety-rated locations with fire rating requirements of 20 minutes without hose stream test; for use in interior and exterior applications.

C. Pyrostop® - Fire-rated, clear and wireless glazing material for use in locations such as doors, sidelites, transoms, borrowed lites, and wall applications with fire rating requirements ranging from 45 minutes to 2 hours with required hose stream test; for use in interior and exterior applications.

D. Product shall pass positive pressure tests standards: UL 10C, UBC 7-2 and UBC 7-4.

E. Safety Glazing: Comply with testing requirements of CPSC 16 CFR 1201, safety regulation for architectural glazing in hazardous locations for Category I & II materials.

1.06 SUBMISSIONS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Product Data – Glass:

1. Submit manufacturer's technical data, specifications, and installation and maintenance instructions for each type of glass required. Include test data substantiating that glass complies with specified requirements.

2. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

C. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

D. Samples:

1. Submit three (3) 8" x 10" samples of each type of glass required. Architect's review of samples will be for color, texture, and pattern only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

E. Shop Drawings: Prior to placement of glass order or glass fabrication, the Contractor shall pertinent shop drawings (i.e. – windows, doors, borrowed light frames, etc.) which have been:

1. Checked and approved by the General Contractor, stamped and dated.
2. Reviewed by the Architect, with stamp affixed.

1.07 QUALITY ASSURANCE

A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.

B. Fire Protective Rated Glass: Each lite shall bear permanent, non-removable label of UL and/or WHI certifying it for use in tested and rated fire protective assemblies.

C. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152 and UL 10B, labeled and listed by UL and/or WHI or other certification agency acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of referenced standard and manufacturer’s written instructions.

B. Deliver all materials to project site in manufacturer’s original packaging, undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

D. Pilkington Pyrostop® must not be exposed outside the range -40 degrees F to 120 degrees F (-40 degree C to +50 degrees C) during storage and transportation. Do not expose the non-PVB side of glass to UV light.

E. Glass that is cracked, broken, chipped, or otherwise damaged during transportation, storage, and erection, and all glazing and sealing materials unfit for use shall be removed from the job site and replaced with acceptable materials at the Contractor's expense.

F. All Glazing broken or damaged during construction up to the date of substantial completion shall be removed from the job site and replaced with acceptable materials at the Contractor's expense.

1.09 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.10 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS - GLASS

A. FireLite Plus® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-425-396-8300, e-mail sales@fireglass.com, web site www.fireglass.com

1. FireLite Plus® glazing sizes shall be as shown on the drawings:

2. Properties: All fire rated ceramic glass designated on the drawings shall carry the following properties:

   a. Thickness: 5/16 inch.
   b. Weight: 4.0 lbs. / sq.ft.
   c. Approximate Visible Transmission: 85 percent.
   d. Approximate Visible Reflection: 9.0 percent.
   e. Fire-Rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications – refer to Contract Drawings for ratings.
   f. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
   g. STC Rating: Approximately 38 dB.
   h. Surface Finish: Standard Grade is polished for a surface quality that is comparable to alternative fire-rated ceramics marketed as having a “premium” finish.
   i. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.

3. Maximum sheet sizes based on surface finish: Standard 48 inches by 96 inches.

4. Labeling: Each piece of FireLite Plus® shall be permanently labeled with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing. FireLite Plus® shall be glazed into the appropriate fire-rated frame(s) with an approved glazing compound (Silicone or Closed Cell PVC Tape) as supplied by the Installer.

5. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00 and ASTM E2010-01; NFPA 252 and NFPA 257; and UL 9, UL 10B, and UL 10C.

B. Fireglass20® as distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-425-396-8300, e-mail sales@fireglass.com, web site www.fireglass.com

1. Fireglass20® glazing sizes shall be as shown on the drawings:

2. Properties: All 20 minute fire rated glass designated on the drawings shall carry the following properties:

   a. Thickness: 1/4 inch.
   b. Weight: 3.0 lbs. / sq.ft.
   c. Approximate Visible Transmission: 89 percent.
   d. Approximate Visible Reflection: 8.0 percent.
   e. Fire-Rating: 20 minutes (WITHOUT HOSE STREAM TEST) – Refer to Contract Drawings.
   f. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II)

3. Labeling: Each piece of Fireglass20® shall be permanently labeled fireglass 20™ with the fireglass 20™ logo, UL logo and fire rating in sizes up to 6,396 sq. in.

4. Fire Rating: Fire rating listed & labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00; NFPA 252; & UL 9, UL 10B, & UL 10C.

C. Pyrostop® as manufactured by Pilkington Pyrostop® as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-425-396-8300, e-mail sales@fireglass.com, web site www.fireglass.com

1. Pyrostop® glazing sizes shall be as shown on the drawings.

2. Composition: Composed of multiple sheets of "Optiwhite" high visible light transmission glass laminated with an intumescent interlayer.

3. Properties: All fire rated ceramic glass designated on the drawings shall carry the following properties:

   a. Thickness: 3/4" (45 min.), 7/8" (60 min.), 1-7/16" (90 min.) & 2-1/8" (120 min.)
      1) For Exterior Use, Insulated Glass Unit: 1-5/16" (45 min.), 1-5/8" (60 min.), 2-1/8" or 2-3/8" (120 min.).
   b. Weight: Varies with thickness (approximate range 9 to 22 lbs./sq. ft.)
   c. Approximate Visible Transmission: Varies with thickness (approximate range 88 to 75 percent).
   d. Fire-Rating: Up to 2 hours – refer to Contract Drawings for ratings.
   e. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
   f. STC Rating: Up to 46 dB.
   g. Exterior Grade: PVB layer on exterior surface.

4. Labeling: Each piece of Pilkington Pyrostop® shall be permanently labeled with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing. Pilkington Pyrostop® shall be glazed into the appropriate fire-rated frame(s) with an approved glazing compound (Silicone or Closed Cell PVC Tape) as supplied by the Installer.

5. Fire Rating: 60 Minutes and Greater: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E 119 and UL 263.

2.02 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Glazing Compound for Fire-Rated Glazing Materials:

1. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

2. Glazing Compound: DAP 33 putty.

3. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

B. Available Products:

1. Dow Corning 795 - Dow Corning Corp.

2. Silglaze-II 2800 - General Electric Co.
3. Spectrem 2 - Tremco Inc.

C. Setting Blocks: Hardwood or calcium silicate; glass width by 4 inches by 3/16 inch thick.

D. Spacers:

1. FireLite Plus® & Fireglass20® - Setting Blocks: Neoprene, EPDM or hardwood; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

2. Pilkington Pyrostop® - Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

E. Cleaners, Primers and Sealers: Type recommended by manufacturer of glass and gaskets.

2.03 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Minimum required face or edge clearances.
3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.02 INSTALLATION

A. Verify, by measurements at the job site, all dimensions affecting this work.

B. Comply with FGMA or GANA (For Pyrostop) standards and instructions of manufacturers of glass, glazing, sealants and glazing compounds.

C. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

E. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

F. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

G. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit. Glass shall be set without springing or forcing and carefully centered laterally and vertically so as to provide uniform clearance.

H. Place glazing tape on free perimeter of glazing in same manner described above.

I. For Fireglass20® Provide minimum edge clearance of >1/4 inch (+1/8 inch/-1/16 inch) and a minimum edge cover of <3/8 inch (+1/16 inch/-1/16 inch).

J. For Pilkington Pyrostop® provide minimum 3/16 inch edge clearance

K. Install removable stop and secure without displacement of tape. Prior to glazing, remove stops and clean out all dirt, oil, droppings, or other material, which will affect proper glazing.

L. Use specified glazing compound, without alteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

M. Install in vision panels in fire-rated doors to requirements of NFPA 80.

N. Install so that appropriate UL and FireLite Plus®, Fireglass20® & Pilkington Pyrostop® markings remain permanently visible and upright.

3.03 PROTECTION AND CLEANING

A. Glass shall be suitably screened from paint, construction debris, and the like. All such soiling occurring on glass shall be promptly and completely washed off by methods approved by the glass manufacturer.

B. Upon completion of installation and acceptance, markings and labels of whatever sort shall be carefully and completely removed from glass panels and the glass washed clean with a mild neutral or slightly acidic solution as recommended by the glass manufacturer, after which no marking or labels of any sort shall be placed on the glass. Care shall be taken during cleaning to avoid scratching of glass surfaces by grit particles.

C. Ventilate buildings after glazing by opening windows slightly to prevent condensation on glass. Maintain ventilation until compound has set.

3.04 GUARANTEE

A. The Contractor shall guarantee all workmanship and material in accordance with the General Conditions and Section 017000 – Contract Closeout.

3.05 GLAZING SCHEDULE

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	**OR**	Max. Height Of Exposed Glazing (In.)	Stop Height
20 min.	Doors					
	HMS or Wood*	3,204	36		89	5/8”
	Fireframes D.S.	3,204	36		89	3/4"
	Other than doors					
	HMS or Wood	3,325	95		95	5/8”
	Fireframes D.S.	3,325	95		95	3/4"

45 min.	Doors				
	HMS or Wood	3,204	36	89	5/8”
	Fireframes D.S.	3,204	36	89	3/4"
	Other than doors				
	HMS or Wood	3,325	95	95	5/8”
	Fireframes D.S.	3,325	95	95	3/4"
60 min.	Doors (non-temp rise)				
	HMS or Wood	3,204	36	89	5/8”
	Fireframes D.S.	3,204	36	89	3/4"
	Doors (temp rise)	100	12	33	5/8”
	Other than doors				
	HMS or Wood	3,325	95	95	5/8”
	Fireframes D.S.	3,325	95	95	3/4"
90 min.	Doors (non-temp rise)	2,034	36	56 ½”	3/4”
	Doors (temp rise)	100	12	33	1/2”
	Other than doors				
	HMS	2,627	56 ½”	56 ½”	5/8”
	Fireframes D.S.	2,627	56 ½”	56 ½”	3/4"
3 hours	Doors	100	12	33	1/2”

* HMS indicates hollow metal steel framing. Fireframes D.S. indicates Designer Series narrow profile framing. For wood frames, check with manufacturer for maximum tested glass sizes.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 092900 – GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Division 01 - General Requirements" which form part of this specification.

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. Related work specified under other sections of the specifications:

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.

1.02 RELATED WORK

A. Related work specified under other sections of the specifications:

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 Conditions of Contract, including General and Supplementary Conditions 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. Related Work:

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 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 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 035413 – Self-Leveling Gypsum Underlayment
D. Section 035416 – Self-Leveling Cementitious Underlayment
E. Section 061000 – Rough Carpentry
F. 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): ΔE < 8avg.,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 096800 – CARPETING

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 necessarily limited to, the following:

1. Carpeting in rooms and spaces designated on drawings.
2. Rubber base as required by the work.
3. Carpet accessories as required by the work.
4. Substrate preparation as required by the work.

1.02 RELATED WORK

A. Related work specified in other sections of the specifications.

1. Section 096519 - Resilient Floor Tile.

1.03 CONTRACT DOCUMENTS

A. Applicable provisions of the "Conditions of the Contract" and the General and/or Supplementary Conditions shall govern all work under this section.

1.04 QUALITY ASSURANCE

A. Installer's Qualifications:

1. A minimum of three years experience.
2. Successfully completed projects of similar magnitude.

B. Accessibility Requirements:

1. Floor surfaces shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this Section.

1.05 SUBMITTALS

A. Comply with requirements of Section 013300 – Submittal Procedures.

B. Manufacturer’s product data, installation and maintenance instructions for all components of the work.

C. Shop Drawings:

1. Carpeted areas shall include the entire area of the room or space, recesses, closets, and similar areas or as indicated on finish floor plans.

2. Shop drawings shall indicate a working layout for each area showing seam locations, pattern of carpet, colors, trim or edge strips, and other pertinent details.

3. No carpet shall be installed before approvals have been received.

D. Samples:

1. Submit two samples of each of the following for approval:

a. Carpet: 12" x 12" each type, pattern, and color.
b. Rubber base or other accessories: Manufacturer’s standard sample sizes.

E. Certificates: Prior to shipment of materials, submit to the Architect for approval certificates signed by the manufacturer attesting compliance with specifications.

1.06 DELIVERY, STORAGE, AND HANDLING

A. All carpeting shall be delivered to the job in the original mill wrappings with each roll having its register number properly marked thereon.

B. Adhesives, solvents, and the like shall be delivered to the job in the manufacturer's original unopened containers, clearly marked.

C. All materials shall be stored under cover in clean, dry, well ventilated spaces immediately after delivery to the job. Any material which becomes damaged or soiled and, in the opinion of the Architect, cannot be repaired, will be replaced with new specified material at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All carpeting shall be first quality. No "seconds" or "imperfects" shall be installed.

B. All carpet shall be Class I and shall have minimum critical radiant flux of not less than .45 watts/sq. cm.

C. All Broadloom carpeting shall be "Constellation-Ecoworx Performance Broadloom" as manufactured by "Shaw Contract Commercial Carpets" or approved equal, of color to be selected by the Architect from the manufacturer’s standard line.

Product Type: Performance broadloom
Size: Broadloom 12 foot
Construction: pattern loop
Dye Method: solution & yard dyed
Fiber Product: 100% eco*solution q® nylon – 55% solution dyed/45% space dyed
Protective Treatment(s): SSP® Shaw soil protection
Primary Backing: SYNTHETIC
Secondary Backing: Ecoworx performance broadloom
Gauge: 1/10
Face Weight: 26 oz.
Stitches per inch: 09.83
Finished Pile Thickness: 0.120
Average Density: 7,800 ozs./yd3
Pattern Repeat: 13/32”W X 6 29/32”L
Flammability: ASTM E-648 flooring radiant panel class I, ASTM E-662 NBS smoke chamber less then 450

Electrostatic Propensity: less than 3.5 KV, permanent conductive filament
Warranty: lifetime commercial limited warranty for ecosolution q sd nylon, lifetime commercial limited warranty for Ecoworx performance broadloom backing system
Recommended Installation: full spread Shaw 3500 or Shaw 3600 adhesives
Post Consumer Recycled Content: 0
Post Industrial Recycled Content: 9.7
Green Label Certification #: 59269968
Green Label Plus Certification #: GLP9968

D. All carpet tile shall be “Constellation-Tile” as manufactured by "Shaw Contract Commercial Carpets" or approved equal, of color to be selected by the Architect from the manufacturer’s standard line.

Product Type: carpet tile
Size: 24” x 24”
Construction: loop
Dye Method: solution & yarn dyed
Fiber Product: 55% ECO SOLUTION Q PREMIUM BRANDED NYLON-45% YARN DYED BCF NYLON
Protective Treatment(s): antistatic, SSP® Shaw soil protection, florsept antimicrobial
Primary Backing: SYNTHETIC
Secondary Backing: Ecoworx®
Gauge: 1/10
Face Weight: 24 oz.
Stitches per inch: 09.83
Finished Pile Thickness: 0.099
Average Density: 8,727 ozs./yd3
Pattern Repeat: N/A
Flammability: ASTM E-648 flooring radiant panel class I, ASTM E-662 NBS smoke chamber less than 450
Electrostatic Propensity: less than 3.5 KV, permanent conductive filament
Warranty: lifetime commercial limited warranty for Ecoworx tile backing system
Recommended Installation: monolithic
Post Consumer Recycled Content: 0
Post Industrial Recycled Content: 37.4
Green Label Certification #: 59269968
Green Label Plus Certification #: GLP9968

2.02 CARPET ACCESSORIES

A. Rubber Cove or Wall Base

1. Rubber cove or wall base shall be extruded and as manufactured by Roppe Corporation or equal. It shall be constructed of first quality materials, properly vulcanized, and shall be smooth and free from imperfections which detract from its appearance. The base shall conform fully to the requirements of U.S. Federal Specification SS-W-40a, Type I Rubber. All cove base shall be of the straight Style A, with a height of 4” (101.6 mm), in lengths continuous coil (1.22 m), in the color stated (see No. 4 below), and of 1/8” (3.175 mm) thickness.

2. Height: 4”

3. Thickness: 1/8” gauge.

4. Color: as may be detailed in the finish floor plans or as selected by Architect.

B. Rubber Carpet Edge Guard: shall be by Roppe, or equal. Colors as selected by Architect. Provide

edge type as follows:

1. Carpet to Vinyl: Roppe #50 tile/carpet joiner or equal.

2. Carpet Termination Reducer: Roppe #38 or #39, or equal. Glue down carpet edge as required.

3. Coordinate with door schedule (if included) and any metal thresholds that may be indicated under that component of the work.

C. Rubber Stair Nosing: Roppe #13 or #14 single flange carpet stair nosing as required or equal.

D. Adhesive: Water-based, water resistant and non-staining as recommended by carpet manufacturer to comply with flammability and VOC requirements for installed carpet.

E. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for use in taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams. Shaw recommends the use of Shaw 3500 or 3600 (AATCC174) adhesives or equivalent adhesives, which have been formulated with a higher solids content and will perform adequately with the Eco Broadloom backings.

F. Leveling and Patching Compounds: Types as recommended by carpet manufacturer and as appropriate for compatibility with substrate.

2.03 OTHER ACCEPTABLE MANUFACTURERS

A. Collins and Aikman
B. Bentley/Prince Street
C. Interface
D. An equal approved by the Architect

PART 3 – EXECUTION

3.01 PREPARATION AND SUBFLOOR CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install carpet until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1. Dimensions supplied in these specifications and drawings are approximate. The Contractor shall carefully check dimensions and other conditions affecting his work in the field and shall be responsible for proper installation of carpet in areas designated.

2. Surfaces to receive carpet shall be thoroughly clean, smooth, free from irregularities, and dry; apply sealer recommended by carpet manufacturer to prevent dusting if required.

3. Contractor shall prepare floors to receive new flooring by washing, etching, sanding, or filling or other procedures as necessary for satisfactory installation.

B. Subfloor Moisture Conditions: Moisture emission rate of not more than 5 lbs./1000 sq.ft./24 hours where tested by anhydrous calcium chloride moisture test in compliance with CRI 104, with subfloor temperatures not less than 55ºF.

1. Contractor shall include in the base bid additional costs for any additional surface preparation work and materials required to install carpet relative to specific slab-moisture content.

C. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

D. Apply latex underlayment where required to correct subfloor. Fill concrete slab on grade control joints with latex or as recommended by manufacturer for proper substrate. Underlayment shall be steel troweled smooth to prevent marks showing through installed carpet. Substrate imperfections telegraphing through installed carpet will not be acceptable and shall be reason to remove.

E. Concrete floors must be sealed if dusting or powdering exists. **Do not use sweeping compounds as they may leave oily deposits.** The following floor sealers are suggested for concrete. Coordinate with manufacturers requirements for materials selected.

1. Shaw Contract 9050 Floor Sealer and Shaw 8550 Level Primer.

2. Kure-N-Seal-Sonneborn #0800 – Chemrex, Inc.

3. Spartan Cote Cure Seal Hardener – The Burke Group.

3.02 INSTALLATION

A. Carpeting shall be installed in accordance with the manufacturer's instructions and the best methods of the trade.

B. All surfaces to receive carpet shall be level, smooth, clean, and dry, in a finished condition suitable to receive carpet. The carpet contractor shall notify the Owner in writing of any and all conditions to the contrary or otherwise unsatisfactory. In an instance where the flooring Contractor is the Prime Contractor, this Contractor shall be responsible for all floor preparation unless otherwise indicated. The installation of carpet shall be an indication of his acceptance of the existing conditions. No carpet shall be installed before approval.

C. Broadloom carpet shall be installed with adhesive applied directly to the sub-floor. Where seams occur in carpeting, they shall be seam sealed and latex reinforced with a lifetime edge ravel warranty. Where edge of carpeting butts other flooring material, the edges shall be protected with rubber edge strip unless aluminum thresholds are otherwise indicated. Edging shall be anchored to concrete floors with adhesive.

1. Fit sections of carpet prior to application of adhesive. Trim edges and butt caps with seaming cement.

2. Apply adhesive uniformly to substrate in accordance with manufacturer’s instructions. Butt edges tight to form seams without gaps. Roll entire area lightly to eliminate air pockets and ensure uniform bond. All seams on vinyl backed carpet are to be chemically welded.

3. All patterned carpet shall have pattern aligned at seams.

D. Carpet tile shall be installed with pressure sensitive adhesive such as Shaw Contract 5000, 5100 or equal. A 3/8” foam paint roller may be used to apply the adhesive. Allow the adhesive sufficient open time so that it will not transfer to the back of the tile. **The adhesive must be allowed to dry completely before installing the carpet.** Installing into wet adhesive will result in a permanent bond and may cause carpet to bubble. **NOTE – A FULL SPREAD OF ADHESIVE IS REQUIRED.**

E. Roll entire installation with a 75# roller at completion.

F. On completion of installation, dirt, carpet scraps etc., must be removed from the surface of the carpet. The carpet must be cleaned with a beater type vacuum cleaner. Soiled spots or adhesive on the carpet shall be removed with the proper spot remove. Loose pieces of face yarn must be removed with sharp scissors.

G. Use plywood over the carpet when heavy objects are moved within 24 hours after installation. A non-staining building material paper must be placed over the carpet to protect it when additional construction activity is to take place that would soil or stain it. **Do not use plastic sheeting as it will trap moisture.**

3.03 MAINTENANCE

A. The carpet manufacturer shall conduct a maintenance seminar for Owner's personnel.

B. Include a maintenance schedule and a list of necessary equipment required to maintain carpet.

3.04 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below packaged with protective covering for storage and identified with labels describing contents.

1. Carpet & Carpet Tile: Furnish quantity of material, in full width roll, equal to 2 percent of the amount of each carpet type installed, but not less than 100 sq. ft.

3.05 WARRANTY

A. Manufacturer must guarantee the following:

1. Abrasive Wear: Warrant that the carpet will lose no more than 10 percent by weight of pile face fiber during the lifetime warranty period when installed and maintained in accordance with manufacturer's procedures.

2. Static Protection: Warrant that the carpet will not generate static build-up in excess of 3.5KV during the lifetime warranty period as tested by AATCC test method 134.

3. Backing Integrity Delamination: Warrant that the secondary backing of the carpet will not delaminate from the face carpet for lifetime warranty period. Chair pads are not required whether the carpet is installed direct to the floor or by conventional tackless installation over cushion.

4. Edge Ravel: Warrant that under normal use the carpet will not edge ravel at seams or edge for the lifetime warranty period.

5. Tuft Bind: Warrant that the carpet will have an average face yard tuft bind of 20 pounds for the lifetime warranty period when tested using the ASTM D-1335-67 method. This portion of the warranty must protect against insufficient tuft bind, whether the carpet is dry or wet (as it might be during steam cleaning, hot water extraction, or as a result of a broken pipe or flood).

6. Pattern matching of seams (Broadloom only): Warrant that under normal use the carpet will pattern match within acceptable industry standards. Regardless of pattern repeat size, when installed in accordance with manufacturer installation guidelines.

7. Moisture Management (Broadloom Only): Warrant that under normal use, the carpet will keep liquid spills above the pre-coat layer for a minimum of 24 hours as tested under the British Spill Method; Part 2.

B. Warranty shall be from the manufacturer, written specifically for the project.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 099000 – PAINTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General Supplementary Conditions and Division 01 Specification Sections, apply to 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. Related Sections:

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)	N	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	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.

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 101100 – VISUAL DISPLAY UNITS

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 the work of this section.

1.02 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 necessarily limited to, the following:

1. Porcelain Enamel Steel Markerboards and Chalkboards.
2. Vertical and Horizontal Sliding Units.
3. Tackboards.
4. Accessories.

1.03 REFERENCED STANDARDS

A. American Society for Testing Materials

1. ASTM-E 84 Standard Test Method for Surface Burning Characteristics for Building Materials.
2. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Wires, Profiles and Tubes.

B. Porcelain Enamel Institute

1. PEI-1002 Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.

C. GREENGUARD Certification from UL Environment

1. Meets GREENGUARD Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall be a firm engaged in the manufacture of visual display boards in the United States.

2. Manufacturer shall have a minimum of 5 years experience in the manufacture of visual display boards.

B. Regulatory Requirements: Conform to applicable code for flame/smoke rating in tackboards in accordance with ASTM-E 84.

C. Product Certifications: Provide GREENGUARD Gold certificate for markerboards, as applicable.

D. Operation and Maintenance: Include data on regular cleaning, stain removal, and precautions.

1.05 SUBMITTALS

A. General: Comply with requirements of Section 013300 – Submittal Procedures.

B. Shop Drawings: Provide shop drawings for each type of visual display board required.

C. Product Data: Provide technical data for materials specified. Include Material Safety Data Sheets, when applicable.

D. Samples and color charts: Provide Manufacturer's color charts and composition samples of face, core, backing and trim to illustrate finish, color and texture, where required.

E. Manufacturer's Instructions: Provide Manufacturer's installation instructions.

1.06 PROJECT CONDITIONS

A. Field measure prior to preparation of shop drawings and fabrication to ensure proper fit.

B. Comply with manufacturer's recommendations for climatizing area for interior moisture and temperature to approximate normal occupied conditions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delay.

B. Delivery: Deliver materials in original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.08 WARRANTY

A. Submit a "Life of the Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, Claridge porcelain enamel steel chalkboards and markerboards are guaranteed for the life of the building. Guarantee covers replacement of defective boards but does not include cost of removal or reinstallation.

B. Submit a standard warranty, stating when installed in accordance with manufacturer's instructions and recommendations, Claridge tackboards are guaranteed for one year against defects in materials and workmanship. Guarantee does not cover normal wear and tear, improper handling, any misuse, or any defects caused by vandalism or subsequent abuse. Guarantee covers replacement of effective material but does not include cost of removal or reinstallation.

C. Writing Surface Warranty Period: 10 years commending on Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Visual Display Board Manufacturer:
Claridge Products and Equipment, Inc., Contact: P.O. Box 910, Harrison, AR 72602;
Telephone: (870)743-2200; Fax:(870)743-1908;

E-Mail: claridge@claridgeproducts.com;
website: www.claridgeproducts.com.

B. The terminology used may include reference to the 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.

C. Products used shall be those upon which the design is based or shall be equal products as approved in advance by the Architect.

D. All chalkboards and tackboards shall be by one manufacturer.

2.02 MATERIALS FOR MARKER BOARDS AND CHALKBOARDS

A. Writing Surface Face Sheet – Manufactured in accordance with Porcelain Enamel Institute's specification.

1. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste.

2. Enameling grade steel shall be coated with LCS³ Porcelain Enamel by Claridge Products and Equipment.

a. 3-Coat process shall include:

1) Bottom Ground Coat – 1.5 to 2.2 mils
2) Top Ground Coat – 2.0 to 2.8 mils
3) Top Cover (Color) Coat – 3.0 to 4.0 mils

3. Firing Temperature: Enamel shall be fired at lowest possible temperatures to reduce steel and porcelain stresses and achieve superior enamel and hardness.

4. Color: As selected by architect from manufacturer's standards. Color charts furnished on request. NOTE: LCS³ No. 100 White can be used as a projection surface.

B. Writing Surface Core

1. 7/16" Medium Density Fiberboard (MDF) composed of approximately 90% post- industrial waste.

C. Writing Surface Backing

1. Aluminum Sheet Back

D. Factory Framed Markerboards and Chalkboards

1. Claridge Factory-Built Chalkboards:

a. Face Sheet: 24 Gauge Vitracite Chalkboard.
b. Core Material: 7/16" MDF.
c. Panel Backing: 0.005" Aluminum Foil Panel.
d. Series: Series 1.
e. Typical Arrangement: Type A, Type C, Type D, Type F, Type H, Type BR, reverse BL, Type ER, reverse EL, or Type GR, reverse GL – as indicated on drawings.
f. Panel Size: As indicated on drawings.
g. Panel Color: Color(s) to be selected from manufacturer's standard colors. Color charts

furnished on request.

2. Claridge Factory-Built Markerboards:

    a. Face Sheet: 24 Gauge LCS Markerboard.
    b. Core Material: 7/16" MDF.
    c. Panel Backing: 0.005" Aluminum Foil Panel.
    d. Series: Series 1.
    e. Typical Arrangement: Type A, Type C, Type D, Type F, Type H, Type BR, reverse BL, Type ER, reverse EL, or Type GR, reverse GL – as indicated on drawings.
    f. Panel Size: As indicated on drawings.
    g. Panel Color: Color(s) to be selected from manufacturer's standard colors. Color charts furnished on request.

3. Claridge Horizontal Sliding Markerboard/Chalkboard

    a. Series: Two Track
    b. Sliding panels and back panel x writing surface. 24 gauge steel LCS markerboard or 24 gauge steel Vitacite chalkboard.
    c. Core: 3/8" Honeycomb (Sliders) 3/8" particle board (back panel).
    d. Backing: Steel (Sliders) moisture barrier back (back panel).
    e. Sizes: As indicated on drawings.
    f. Typical arrangement: Two (2) sliding panels and back panel to match sliding writing surfaces.
    g. Fabrication: Reinforced corners with angles to strengthen frame. Nylon ball bearing rollers at top of unit and nylon guide rollers at bottom of unit to be of sufficient size and number to eliminate vibration and provide smooth and quiet operation of the panels.

4. Claridge Modular Markerboard, Chalkboard and Tackboard Units (Where noted on drawings):

    a. Typical Arrangement: MOD3.
    b. Writing Surface: 24 gauge Vitracite chalkboard and/or 24 gauge LCS markerboard.
    c. Tackboard Surface: Fabricork.
    d. Panel Size: As indicated on drawings.
    e. Wall Standards: Single or double aluminum wall standards, slotted to receive special modular panel clips. Standards to be fastened directly to wall on 4 foot centers.
    f. Panel Color: Color(s) to be selected from manufacturer's standard colors.

2.03 MATERIALS FOR TACKBOARDS

A. Claridge Cork: Composed of 1/4" thick self-healing, burlap backed cork laminated to a ¼" hardboard backing.

B. Factory Framed Tackboards

1. Claridge Factory Built Tackboards:

    a. Tackboard Surface: Designer Fabric: Fabric on cork underlay with 1/4" hardboard back.
    b. Series: Series 1.
    c. Typical Arrangement: Type CO, Type C, Type D, Type F, Type H, Type BR, reverse BL, Type ER, reverse EL, or Type GR, reverse GL – as indicated on drawings.
    d. Panel Size: As indicated on drawings.
    e. Panel Color: Color(s) to be selected from manufacturer's standard colors. Color charts furnished on request.

C. Claridge Tackwalls:

1. Edgewrapped panels of fabric butted together or arranged in configurations as shown on drawings.

a. Designer Fabric (3104EW), fabric on duracore backing with edges wrapped.
b. Architect shall select from fabric manufacturer's (Guilford of Maine) product line.

2.04 ALUMINUM TRIM

B. Trim shall be 6063 alloy grade aluminum with T5 tempering in accordance with ASTM B221, and shall have 201-R1 satin anodize finish.

1. Factory-Built Trim:

a. Series: Series 1.

2. Field-Assembled Trim:

a. Snap-On Aluminum Trim.
b. Length: As required by size indicated on drawings.
c. Finish: Satin Anodize.

C. Accessories:

1. Marker Tray/Chalktrough:

a. Standard continuous, hollow, box-type aluminum tray with injection molded end closures at bottom of each markerboard or chalkboard.

2. Map Rail:

a. Standard continuous 1" map rail with cork insert and end stops at the top of each chalkboard or markerboard.

3. Accessories:

a. Map Hooks: One map hook furnished for every two feet of Map Rail on Factory-Built Units.
b. Roller Brackets: (2) two each.
c. Flag Holders: (1) one each.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of the work. Allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.

B. Verify before installation that interior moisture and temperature approximate normal occupied conditions and HVAC is in place and working.

C. Verify that wall surfaces are true and plumb and are prepared and ready to receive boards.

3.02 INSTALLATION

A. Delivery factory-built chalkboard and tackboard units completely assembled in one piece without joints, whenever possible. Where dimensions exceed panel size, provide two or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Follow manufacturer's instructions for storage and handling of units before installation.

C. Install units in locations and mounting heights indicated and in accordance with the manufacturer's instructions. Keep perimeter lines straight, plumb, and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

    1. Anchor all components securely using tamper-proof fasteners, where accessible or with completely concealed continuous hangers.

D. Coordinate job-site assembled units with grounds, trim, and accessories. Joint all parts with a neat, precision fit.

E. Do not install boards on damp walls or in damp and humid weather without heat in the building.

3.03 ADJUST AND CLEAN

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units in accordance with the manufacturer's instructions. Break in chalkboards and marker boards only as recommended by the manufacturer.

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 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 102226 – OPERABLE PARTITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions of Division 01 Specification Sections, apply to this section.

1.02 SUMMARY

A. This Section includes the following:

1. Manually operated, paired panel operable partitions.

B. Related Sections include the following:

1. Section 033000 – Cast-in-Place Concrete - for concrete tolerances required.
2. Section 051200 – Structural Steel Framing - for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.
3. Section 061000 – Rough Carpentry - for wood framing and supports, and all blocking at head and jambs as required.
4. Section 092900 – Gypsum Wall Board - for wall and ceiling framing at head and jambs.

C. Furnish and install operable partitions and suspension system. Extent of manual paired panel operable partition work required is indicated on drawings and in schedules.

D. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.

1.03 RELATED WORK BY OTHERS

A. The Contractor shall fully prepare the opening. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the Architect by the Contractor.

B. The Contractor shall install all header, blocking, support structures, jambs, track enclosures, surrounding insulation, and sound baffles as required in Section 1.04 - Quality Assurance.

C. The Contractor shall ensure pre-punching of support structure in accordance with approved shop drawings.

D. The Contractor shall paint or otherwise finish all trim and other materials adjoining head and jamb of operable partitions, as called for in Finish Schedule.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.

B. The operable partition work shall be done by a single firm specializing in the type of work required, so that there will be undivided responsibility for the specified performance of all component parts.

The Contractor shall be solely responsible for all work performed by his subcontractor for the work of this Section.

C. Details shown are based upon standard details by one manufacturer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with the size requirements, with minimum/maximum profile requirements as shown, and with the specified structural and performance requirements.

D. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure and classified in accordance with ASTM E413 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

E. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

F. The operable wall must be manufactured by a certified ISO-9001-2015 company or an equivalent quality control system.

1.05 REFERENCE STANDARDS

A. ASTM International

1. ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. ASTM E84 - Surface Burning Characteristics of Building Materials.
4. ASTM E413 - Classification for Rating Sound Insulation.

B. Health Product Declaration Collaborative

1. Health Product Declaration Open Standard v2.1.

C. International Standards Organization

1. ISO 14021 - Environmental Labels and Declarations - Self-Declared Environmental Claims (Type II Environmental Labeling).
2. ISO 14025:2011-10, Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures.
3. ISO 14040:2009-11, Environmental Management - Life Cycle Assessment - Principles and Framework.
4. ISO 14044:2006-10, Environmental Management - Life Cycle Assessment - Requirements and Guidelines.
5. ISO 21930 – Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services.

D. Other Standards

1. ADA – Americans with Disabilities Act.
2. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

1.06 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.

C. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

D. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.

E. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

F. Reports: Provide a complete and unedited written sound test report indicating glass thickness and spacing in test specimen matches product as submitted.

1.07 DELIVERY, STORAGE AND HANDLING

A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.

B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.08 WARRANTY

A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.

B. Warranty period: Three (3) years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS, PRODUCTS AND OPERATION

A. Manufacturers: Subject to compliance with requirements, provide products by the following or architect approved equal.

Modernfold, Inc.
215 West New Road
Greenfield, IN 46140
Toll Free: 800.869.9685
email: info@modernfold.com
www.modernfold.com

B. Upon compliance with all of the criteria specified in this section, manufacturers wishing to bid products equal to the product specified must submit to the architect 10 days prior to bidding complete data in support of compliance and a list of three past installations of products similar to those listed. The submitting manufacturer guarantees the proposed substituted product complies with the performance items specified and as detailed on the drawings.

C. Products: Subject to compliance with the requirements, provide the following product:

1. Acousti-Seal Encore™ – Paired Panel: Manually operated paired panel operable partition.

2.02 OPERATION

A. Acousti-Seal Encore™ – Paired Panel: Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals and automatic top seals.

B. Final Closure:

1. Horizontally expanding panel edge with removable crank.

2.03 PANEL CONSTRUCTION

A. Nominal 4-1/4-inch (108 mm) thick panels in manufacturer's standard 51-inch (1295 mm) widths. All panel horizontal and vertical framing members fabricated from minimum 16-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.

B. Panel Skin:

1. Roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction.

a. 56 STC - 16-gage steel.

C. Hinges for Panels, Pass Doors, and Pocket Doors:

1. Full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.

D. Panel Trim: No vertical or horizontal trim required or allowed on edges of panels; minimal groove appearance at panel joints.

E. Panel Weight:

1. Steel Skin - 56 STC – 11.9 lbs./square foot.

2.04 PANEL FINISHES

A. Panel face: (Refer to Drawings for panel face selection)

1. Reinforced vinyl with woven backing weighing not less than 20 ounces (567 g) per lineal yard; class "A" rated material.
2. Full height steel markerboard work surface.

3. Full height 1/4-inch (6.35 mm) natural cork tackboard with vinyl or fabric covering.

B. No exposed panel trim required or allowed, hardware to be of one consistent color:

1. Dark Bronze, Smoke Gray or Natural Choice; Color as selected by Architect.

2.05 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with tongue and groove configuration in each panel edge. Rigid plastic or aluminum astragals are not acceptable.

B. Horizontal Top Seals shall be Modernfold SureSet™ automatic operable top seals, manually operated operable top seals not required or permitted.

C. Horizontal Bottom Seals shall be Modernfold SureSet™ bottom seal.

1. SA2 - Automatic bottom seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13 mm) to –1-1/2-inch (38 mm) which automatically drop as panels are positioned, without the need for tools or cranks. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.

2.06 SUSPENSION SYSTEM

A. #14 Suspension System

1. Suspension Tracks: Minimum 7-gage, 0.18-inch (4.57mm) roll-formed steel. Track shall be supported by adjustable steel hanger brackets connected to structural support pairs of 1/2-inch (13 mm) diameter threaded rods. Brackets must support the load bearing surface of the track.

a. Exposed track soffit: Steel, removable for service and maintenance, attached to track bracket without exposed fasteners, and pre-painted off-white.

2. Carriers: One all-steel trolley with steel-tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.

a. Warranty period: Twenty (20) years.

2.07 OPTIONS

A. Single Pass Doors: (where indicated on drawings)

1. Matching pass door same thickness and appearance as panels. ADA compliant pass door to be trimless and equipped with friction latch and flush pulls for panic operation. No threshold will be permitted.

2. Hardware:

a. Hand pull with push plate.
b. Lever handles both sides of door.
c. Panic hardware with or without locking lever handle.
d. Automatic door closer.
e. Door Viewer. (when indicated on drawings)
f. Self-Illuminated exit signs: Chemical exit sign – recess mount.

B. Work Surfaces: (when indicated on drawings)

1. Markerboard: White enamel on steel, bonded to the face of the panel with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges to provide uninterrupted work surface.

2. Tackboard: Minimum 1/4-inch (6.35 mm) natural cork, covered with vinyl or fabric, with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.

B. The complete installation of the operable wall system shall be by an authorized factory-trained installer.

C. Install operable partitions and accessories after other finishing operations, including painting have been completed.

D. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.

E. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.02 CLEANING AND PROTECTION

A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.03 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.04 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.05 DEMONSTRATION

A. Demonstrate proper operation and maintenance procedures to Owner's representative.

B. Provide Operation and Maintenance Manual to Owner's representative.

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 10 – SPECIALTIES

SECTION 104400 – FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

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 necessarily limited to, the following:

1. Fire extinguishers.
2. Fire extinguisher cabinets.
3. Accessories.

1.02 RELATED WORK

A. Related work specified in other sections of the specifications:

1. Section 042000 – Unit Masonry
2. Section 055000 – Metal Fabrications
3. Section 061000 – Rough Carpentry
4. Section 099000 – Painting

1.03 CONTRACT DOCUMENTS

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.

1.04 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for portable fire extinguishers.

B. Fabricated materials must be the product of a manufacturer known as experienced and able in the specialty trade involved, and the manufacturer shall be approved by the Architect. Provide fire extinguishers. cabinets. and accessories by single manufacturer.

C. All work is to be executed by skilled mechanics and shall be of the finest quality, neat in appearance, and free of defects.

D. Installation shall be made by the manufacturer or by his licensed or franchised representative who shall be approved by the Architect.

1.05 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers
B. ADA Accessibility Guidelines
C. UBC Standard 7-5 (ASTM E-814-83) - Fire-rated cabinet option for combustible and non-combustible walls.

1.06 SUBMITTALS

A. Shop Drawings: Submit complete an accurate shop drawings, details, or illustrated literature to the Architect for approval. No installation shall be made without the prior approval of the Architect.

B. Manufacturers Product Data: Submit manufacturers product literature for both extinguishers and cabinets in accordance with Section 013300.

1.07 JOB CONDITIONS

A. Take and verify all measurements required for the proper execution and fit of the work at the building before starting fabrication or erection and examine the nature of material to which work is to be attached.

B. The Contractor will be responsible for the proper attachment of work furnished under this section and for the work of other trades related to it.

PART 2 - PRODUCTS

2.01 APPLICABLE MANUFACTURERS

A. Where shown on the drawings, provide fire extinguishers. cabinets, accessories manufactured by the following or architect approved equal:

Larsen's Manufacturing Co.,
7421 Commerce Lane N.E.
Minneapolis, MN 55432
(763) 571-1181 or (800)527-7367

2.02 MATERIALS

A. Fire Extinguishers:

1. Furnish and install Multi-Purpose dry chemical fire extinguishers similar or equal to **Model MP5-A**.

2. Body of extinguishers shall be red enameled steel, approximately 16 inches high, 4-1/4 inches in diameter, and weighing approximately 9 lbs. Each extinguisher shall be provided with chrome plated valves, color code nozzles, pressure indicating gauges, charging adaptors, moisture traps, metal pull rings complete with chain, and all other accessories required for a complete installation including metal wall brackets for units not encased in cabinets.

3. Dry chemicals for extinguishers shall be specially fluidized and siliconized mono ammonium phosphate prepared as a multi-purpose product developed for the use of Class A, B, and C fires.

4. Fire extinguishers indicated on drawings not provided with cabinets shall be wall hung on metal brackets from which extinguishers shall be hung. Fire extinguishers shall be installed at height recommended by OSHA and in coordination with ADA guidelines.

5. Fire extinguishers for kitchens shall be equal to **Model No. WC-6L** as produced by Larsen’s Manufacturing Company. Extinguishers to be wall hung on brackets equal to Model No. B1, also by Larsen’s. Wet chemicals for fire extinguishers shall be developed for the use of class “A” and “K” fires. Provide and install as described above.

6. Fire extinguisher units shall be of type approved by the National Board of Fire Underwriters' Standard No. 299, the requirements of the Occupational Safety and Health Administration, and all other local codes and authorities having jurisdiction over same, and they shall bear the necessary labels of the Underwriters' Laboratories, Inc.

7. Fire extinguishers shall have a dial to indicate air pressure.

8. All fire extinguishers shall be of manufacture approved by the Architect.

9. The required quantity, and location of fire extinguishers shall be as shown on the drawings.

10. All fire extinguishers shall be fully charged and left ready for operation.

B. Fire Extinguisher Cabinets:

1. Fully recessed type fire extinguisher cabinets shall be Architectural Series **Model No. FS2409-R1** Fire Rated Cabinet as manufactured by Larsen Manufacturing Company, or equal as approved by the Architect.

2. Semi recessed type fire extinguisher cabinets shall be Architectural Series **Model No. FS2409-R3** Fire Rated Cabinet as manufactured by Larsen Manufacturing Company, or equal as approved by the Architect.

3. Fire extinguisher cabinets shall be fabricated with steel doors. Doors shall be *"Vertical Duo-Panel" style* with clear tempered safety glass and red vertical die cut lettering reading “Fire Extinguisher”.

C. Accessories:

1. Fire Blankets and Cabinets – Provide in all science and shop room locations and additionally where indicated on drawings.

2. Extinguisher Brackets.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that rough openings for cabinets are correctly sized and located.

3.02 INSTALLATION

A. Install the items of this Section in strict accordance with the original design, approved shop drawings, and requirements of agencies having jurisdiction, as approved by the Architect, and approved shop drawings, anchoring all components firmly into position.

B. Installation shall maintain fire rating of partitions requiring same.

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 Provisions of the Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to work of this section.

B. Related sections:

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 123216 – MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 – GENERAL

1.01 SUMMARY

A. Related Documents:

1. Drawings and provisions of the contract including General Conditions Supplementary Conditions and Division 01, apply to this section.

B. Section Includes:

1. Furnish and install plastic laminate casework and accessories as shown and listed on drawings and specified herein. Includes all countertops, sink cutouts, splashes, supports, shelving, and filler panels necessary for a complete casework installation.

C. Related Requirements to be Performed by Others:

1. Section 061000 – Rough Carpentry
2. Section 062000 – Finish Carpentry
3. Section 079200 – Joint Sealants
4. Section 096519 – Resilient Tile Flooring

1.02 REFERENCES

A. ANSI-A135: For all hardboard.
B. ANSI-A161.2-1998: For performance of fabricated high-pressure decorative laminate countertops.
C. ANSI-A208.1-2016: For grade M-3 mat-formed wood particleboard.
D. BHMA A156.9: For grade-1 hinge requirements.
E. NEMA 3 LD-2005: For performance requirements of high pressure laminates.
F. AWS: American Woodworking Standards, Edition 2.

1.03 DEFINITIONS

A. Exposed:

1. In casework, surfaces visible when drawers and opaque doors (if any) are closed; behind clear glass doors; bottoms of cabinets 42" or more above finished floor; and tops of cabinets less than 78" above finished floor.

B. Semi-Exposed:

1. In casework, surfaces that become visible when opaque doors are open or drawers are extended; bottoms of cabinets more than 30" or tops of cabinets less than 42" above finished floor.

1.04 SUBMITTALS

A. Shop Drawings:

1. Comply with Section 013300 – Submittal Procedures.

2. Include catalog numbers and detailed written specifications.

3. Submit three sets of shop drawings consisting of:

    a. Finish, hardware, construction options selection sheet.
    b. Small scale floor plan showing casework in relation to the building.
    c. Large scale elevations and plan views.
    d. Cross-sections; service runs; locations of blocking within walls (blocking is done by others); rough-in requirements and, sink centerlines.

4. Manufacturer and/or Contractor verifies all critical building dimensions prior to fabrication.

B. Samples:

1. Submit one set of laminate color brochures or webpage reference from standard laminate manufacturers Wilsonart, Formica, Pionite, and Nevamar.

2. Submit one edge color sample chain.

3. Submit catalog showing construction details, material specifications and hardware specifications of all items used.

C. LEED Submittals (if required):

1. Provide EPP certificates of core for Credit MR 4.1 for casework core having recycled content.

2. Provide FSC certificate for Credit MR 7: for products having chain-of-custody certificate certifying that the wood used in the casework complies with FSC requirements.

3. Provide product data for IEQ 4.4: for casework core being manufactured without the use of urea formaldehyde.

D. Warranty:

1. Provide sample warranty document stating specified terms as referenced in 1.8.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer has a minimum of 10 years of experience of manufacturing architectural casework for similar projects, with a cataloged product line, and can show evidence of long-lasting financial stability.

2. Certified for chain of custody by third party group approved by Forest Stewardship Council (FSC).

B. Unless otherwise indicated, comply with AWI, for grades of interior architectural woodwork, including installation, complies with requirements of grades specified. The manufacturer, upon award of work, shall register the work under this section with AWI Quality Certification Program (800-449-8811).

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Deliver casework once painting, and similar requirements have been completed that will not damage casework. This includes ensuring spaces are enclosed and weather tight.

2. All casework shall be blanket wrapped for protection during shipping.

B. Storage and Handling:

1. Casework must be protected from dust, dirt and/or other trades.

2. Countertops are stacked, properly supported and spaced evenly to avoid warping. Large pieces are stacked first on the pallets with shorter pieces stacked on top.

1.07 WARRANTY

A. Provide a Five-Year warranty to the owner against defective material and workmanship.

1. The warranty specifically does not cover any product or hardware, which has been incorrectly installed, including poor climate conditions, exposed to excessive loads or abuse.

2. Non-casework items supplied, but not necessarily manufactured by the casework manufacturer including, but not limited to sinks, fixtures, apparatus, fume hoods, keyboard trays, spray booths, lights, power outlets, and power strips shall be covered under the original manufacturers' warranty.

PART 2– PRODUCTS

2.01 MANUFACTURERS

A. Design is based on use of products as manufactured Case Systems Inc., 2700 James Savage Road, Midland, Michigan 48642 (989) 496-9510 www.casesystems.com and/or approved dealers, 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 completion.

2.02 MATERIALS

A. Provide Plastic Laminate Faced Cabinets Manufactured with:

1. Particleboard Core:

a. All particleboard shall be Grade M-3i and shall meet or exceed all requirements as set by ANSI-A208.1-2016.

Modulus of Rupture	2176 psi
Modulus of Elasticity	362600 psi
Internal Bond	73 psi
Linear Expansion	0.40%
Thickness Tolerance	+/- 0.008"
Face Screw Holding	225 pounds Min

2. MR (Moisture Resistant)/FSC Core shall be:

a. Interior-Grade moisture resistant particleboard.
b. Meet or exceed M-3i Grade, according ANSI-A208.1-2016.

3. Low Emitting Core shall be: (For LEED Projects)

    a. ULEF/FSC (No added Urea Formaldehyde) M-2 Particleboard:

        1) For casework core having recycled content.
        2) For casework core being manufactured without the use of urea formaldehyde.
        3) For products having chain-of-custody certificates certifying that the wood used in the casework complies with FSC requirements.

    b. ULEF/FSC (No added Urea Formaldehyde) Plywood:

        1) Plywood that meets or exceeds the standards set forth by the APA for structural use panels.
        2) For casework core being manufactured without the use of urea formaldehyde.
        3) For products having chain-of-custody certificates certifying that the wood used in the casework complies with FSC requirements.

    c. FSC M-3i Particleboard:

        1) For products having chain-of-custody certificates certifying that the wood used in the casework complies with FSC requirements.

    d. FSC Plywood:

        1) For products having chain-of-custody certificates certifying that the wood used in the casework complies with FSC requirements.

B. Joinery:

1. Mechanical Joinery:

    a. All cabinet body components shall be secured utilizing concealed interlocking mechanical fasteners as approved by the AWI Quality Standards 8th Edition-2003 Sections 400A-T-12, 400B-T10 and 1600-T-11.

C. Surface Material:

1. Acceptable laminate color, pattern, and finish as either scheduled or otherwise indicated on drawings or as selected by Architect from manufacturer's standards types and nominal thickness including:

    a. Vertical surface decorative grade VGS: .028" thick
    b. General purpose decorative grade HGS: .48" thick
    c. Cabinet decorative liner grade CLS: .020" thick
    d. Non-decorative backer grade BKH: .028" thick
    e. Thermally fused melamine laminate.
    f. Chemical resistant decorative laminate.

D. Edge banding:

1. PVC

    a. Shall be applied utilizing hot melt adhesive and radiused by automatic trimmers. Edging shall be available in a variety of color options.

E. Adhesives:

1. PVA

    a. Adhesive shall be mechanically applied.
    b. NAUF, no VOC

2. EVA

    a. Adhesive shall be mechanically applied.

F. Protective coating option:

1. All surfaces, including: pulls, hinges, countertops and edge banding be coated with OEM-treated, quat-silane antimicrobial AEM 5772 from AEGIS Environments.

2.03 FABRICATION

A. General Cabinet Body Construction:

1. Cabinet Box Style shall be Reveal Overlay.

2. Cabinet Box Core shall be Particleboard.

3. Bottoms and ends of cabinets, and tops of tall cabinets and tops and bottoms of wall cabinets (all structural components) shall be 1”-inch thick.

4. All panels shall be manufactured with balanced construction.

5. Fixed interior components such as dividers, and cubicle compartments shall be full 3/4" thick and attached with concealed interlocking mechanical fasteners.

6. Cabinet body exterior surfaces shall be: VGS.

7. Cabinet finished interior options shall be: Finished at opens. (Decorative thermally fused).

8. Cabinet body interior surfaces shall be: Thermally Fused.

9. In closed cabinets body front edge shall be: .020" PVC

10. Mounting stretchers are 3/4" thick structural components fastened to end panels and back by mechanical fasteners, and are concealed by the cabinet back.

11. When the rear of a cabinet is exposed, a separate finished 3/4" thick decorative laminate back panel shall be provided.

12. Backs of cabinets are 1/2" thick surfaced both sides for balanced construction and fully captured on both sides and bottom.

13. A 5mm diameter row hole pattern 32mm (1-1/4") on center shall be bored in cabinet ends for adjustable shelves. This row hole pattern shall also serve for hardware mounting and replacement and/or relocation of cabinet components.

14. An upper 3/4" thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. This stretcher is also fastened to the full sub-top thus capturing the back panel.

B. Base Cabinet Construction:

1. All base cabinets, except sink cabinets, shall have a solid 3/4" thick sub-top of core (as specified above), fastened between the ends with interlocking mechanical fasteners.

2. Sink cabinets with a split removable back panel shall have a formed metal front brace, and steel corner gussets shall be utilized to support and securely fasten top in all four corners. Front brace shall be powder coated black.

C. Tall Cabinet Construction:

1. All tall cabinets shall be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate 3/4" thick stretcher located behind the back panel and be secured between the cabinet ends with mechanical fasteners. The stretcher shall be secured to the shelf through the back with #8 x 2" plated flat head screws.

D. Wall Cabinet Construction:

1. All wall cabinet bottoms shall be ¾”-inch thick core (type specified above), mechanically fastened between end panels and secured to the bottom back stretcher. A lower 3/4" thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. The stretcher is also secured through the back and into the cabinet bottom. Wall cabinets over 36” in width shall receive a fixed intermediate partition.

2. All wall cabinet exterior bottoms shall be: Match Exterior Surface.

3. All wall cabinet tops shall be: ¾-inch.

E. Tall and Wall Cabinet Top Edges shall be: .020" PVC at Top of End Panels, Stretchers & Back.

F. Tall, Wall and Hutch Tops shall be: HPL to Match Exterior Surface.

G. Tall, Wall and Hutch Upper Door Reveal shall be: 15mm Reveal.

H. Toe Base of Cabinet:

1. Individual bases shall be constructed of: Pressure treated plywood factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding (not supplied by casework manufacturer). There shall be a front to back center support for all bases over 30" wide.

2. Toe Base Height: 96mm.

3. Toe Base Options: Attached.

I. Drawer Fronts and Solid Doors:

1. All drawer fronts and solid door components shall be: Particleboard surfaced both sides for balanced construction.

2. Options shall be: HPL Door and Drawer Front Exterior and Grade CLS on Interior or Corkboard Doors as selected by Architect.

3. Surfaces shall be: HPL Grade VGS.

4. Door and drawer front edge shall be: 3mm PVC.

J. Drawer Boxes:

1. Drawer box constructed with a full 1/2" thick core shall be: Particleboard non-racking, non-deflecting platform bottom that is carried directly by “L” shaped, bottom mount drawer glides.

2. Drawer box at finished interiors shall be: Surface to Match Standard Interior.

3. Standard: Slides are secured with 1-1/4" long screws driven through the platform and into the sides. Drawer box sides, backs, sub-front, and bottom shall be 1/2". The top edge shall be nominal 1mm (.020") PVC matching the drawer color. Drawer box corners shall be joined with fluted hardwood dowels and glue spaced at a minimum of 32mm on center. Drawer box fronts shall be removable and attached to drawer box sub-front with screws from inside of drawer. Horizontal parting rails between drawers shall be 3/4" thick core, with balanced surfaces, secured to and further reinforcing cabinet ends. File drawer box shall have full-height sides supporting a heavy-duty support rail for hanging file folders.

K. Doors:

1. Solid Doors shall be: ¾" thick core.

2. Glazed Doors, Framed shall be:

a. Hinged or sliding 3/4" thick, framed doors shall be: Tempered Glass Panels. Panels must be 1/4" thick. Glazing panel shall be set into the doorframe with the use of a separate molding. Glazing shall be held in place with removable stops.

3. Glazed Doors, Frameless shall be:

a. Sliding, minimum 1/4" thick tempered glass panels. All edges to be radius ground and polished.

4. Sliding Doors shall be:

a. Extruded aluminum upper track with anodized finish. All tall cabinets shall receive two hanging brackets per door with two rollers per bracket. All other cabinets shall receive two hanging brackets per door with one roller per bracket. The bottom of door shall be captured in a retainer to prevent doors from swinging in or out.

5. Pocket Doors shall be:

a. Zinc plated, self-closing, three-way adjustable geometric door hinge with precision steel ball bearing slides.

L. Shelves:

1. Adjustable:

a. Adjustable shelves shall be: Particleboard with balanced surfaces.

b. Adjustable shelves in closed cabinets shall be: 1" for All Shelves.

c. All adjustable shelves in open cabinets shall be: 1" thick, except for special use cabinets such as mail, cubical, instrument or locker type units.

d. Adjustable shelf edge on open cabinets shall be: 3mm PVC on Front Edge.

e. Adjustable shelf edge on closed cabinets shall be: .020" PVC on All Four Edges.

f. Adjustable shelf shall be set back: 15mm from the front or 23mm setback option when locks are used.

2. Fixed:

a. Fixed shelves shall be: Particleboard.

b. Fixed shelves shall be: 1" for All Shelves.

c. Fixed shelf surfaces on closed cabinets shall be: Match Interior Selections.

d. Fixed shelf surfaces on open cabinets shall be: HPL to Match Exterior.

3. Wall shelving selections for model numbers R204, R205, R206 only shall be:

a. 3mm PVC.

b. Particleboard

c. Thermally Fused

4. Wire Shelves shall be white, plastic coated.

5. Hardboard Shelves shall be ¼" thick tempered hardboard. All hardboard shall have a “S2S” surface finish.

M. Specialty Products:

1. Countertops:

a. High-pressure decorative laminate, nominal 1-1/2" thick buildup, conforming to NEMA Standard LD3-2005 and ANSI A161.2-1998.

1) General Purpose: HGS.

2) Laminate bonded to M-2: Particleboard core with PVA rigid adhesives. Core shall be balanced with backing Grade BKL.

3) All joints shall be secured with biscuits for alignment and tight joint fasteners.

4) Provide 4" high back splashes with thickness matching countertop thickness where shown and at all ends abutting walls and adjacent cabinets.

5) Provide edges: 3mm

6) The maximum lengths of HPL buildup particleboard tops is 12’ and the maximum lengths of HPL buildup plywood tops is 8’.

2.04 FINISHES

A. Plastic Laminate Casework Colors:

1. High Pressure Laminate is available in non-premium, non-specialty and manufacturers' standard suede finishes from our select laminate manufacturers, including:

    a. Wilsonart® in a "60" or "38" matte finish and Standard: Formica in a "58" finish, unless otherwise noted on the Construction Documents.

    b. Color: Specialty and other manufacturer finishes are available with additional cost and longer lead times.

2. Thermally Fused Melamine Laminate that meets performance requirements of ANSI/NEMA 3 LD – 2005 for GP-28.

    a. Natural Almond (Wilsonart D30), Fashion Grey (Wilsonart D381), Frosty White (Wilsonart 1573).

3. Cabinet Liner .020" thick, high-pressure cabinet liner conforming to ANSI/NEMA 3 LD – 2005, Grade CLS. Surface texture shall be similar to exterior finish. Color shall match interior.

    a. Almond, Grey, White.

B. Accessories:

1. Hinges:

    a. 5-Knuckle Hinge / Reveal Overlay: Three finishes are available as standard in epoxy powder coat: Black, or Almond, or Platinum.

2. Pulls:

    a. 96mm Stainless Steel

    b. Epoxy Coated Wire Pulls shall be available as standard in: Almond, Platinum, or Black. Or as specified by Architect.

C. Glazed Door Trim shall be one of our standard colors: Black, White, Almond, or Grey.

D. Countertop Supports shall be in one of our standard colors: HPL to match.

E. Round Grommet shall be in one of our standard colors: Black.

F. Round Grommets shall be in one of our standard colors: Black.

2.05 ACCESSORIES

A. Hardware:

1. Hinges

    a. 5-Knuckle Hinges/Reveal Overlay: Standard: Hinges shall be: .095" thick settle five-knuckle hospital-tip, institutional Grade (Grade 1 per ASNI/BHMA A156.9) quality with .187" diameter tight pin. Each hinge shall be secured with a minimum of nine No. 8 screws. Hinge shall permit door to swing 270 degrees with binding. Doors less than 48" in height shall have two hinges. Doors have over 48" in height shall have three hinges.

2. Pulls:

a. One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life.

1) Epoxy coated wire pull, 8mm diameter with 96mm O.C. mounting holes.

3. Drawer Slides:

a. Full extension, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100lb. load rating, must be: full extension, and prevent drawer fronts from contacting the cabinet body. Drawer slides must meet or exceed Grade 1 requirements per ANSI/BHMA.

4. Wall Shelving Hardware:

a. Heavy-duty wall shelving hardware, including standards and brackets, are available in an anochrome finish.

b. Bracket Mounted Shelf Core shall be: Particleboard.

c. Bracket Mounted Shelf Edge shall be 3mm.

d. Bracket Mounted Shelf Surface shall be: VGS Laminate.

5. Shelf Clips:

a. Shelf clips shall be injected molded clear plastic, with a double pin engagement 32mm on center and shall have 3/4" and 1" anti-tip locking tabs as approved in AWI 400B-T-9 for premium Grade. Shelf clips shall be: single pin plastic shelf clip with anti-tip locking tabs, used for all 1/4" hardboard shelves.

6. Coat Hooks shall be Zinc plated, single prong and double prong.

7. Closet Rods shall be Zinc plated rod, 1" diameter with captive sockets.

8. Locks:

a. Lock Locations:

1) Locks at All

b. Lock Type:

1) Standard Lock – National: Five disc tumbler cam locks, chrome plated steel faceplate. All locks keyed alike or keyed differently by room and mater keypad. Shall permit a minimum of 50 keying options. Lock core is removable permitting owner to easily change lock arrangements. Inactive door of base and wall cabinets shall be: secured by using an elbow catch, or a chain pull for tall cabinets].

9. Casters:

a. Shall be available in both 4" (3" diameter wheel) and 6" (5" diameter wheel) nominal heights. 4" casters must have a minimum load rating of 165 lbs per caster and the 6" casters must have a minimum load rating of 200 lbs per caster. Shall be ball bearing with 360° swivel. Shall have non-marring wheels available in both locking and non-locking.

10. Catches:

a. Chain Pulls shall be zinc plated, spring loaded door catch used to hold door securely shut.

b. Chain Stops shall be zinc plated, looped chain used to limit door swing as specified, mounting plate at each end of chain shall use (4) #7 x 5/8" screws to secure to cabinet door and end panel. They shall be on cabinets at adjoining walls and where casework and countertops can interfere with the door swing of the tall cabinet.

c. Elbow Catch shall be chrome plated, spring loaded, used to hold non-locking door securely shut.

d. Roller Catch, (not used with self-closing hinges) shall have: heavy-duty, spring-loaded roller, with molded plastic bumper mounted at door top to keep door securely shut.

e. Magnetic Catch, (not used with self-closing hinges) shall have: white plastic housing with two 32mm spaced, elongated holes for screw-attachment to allow adjustability.

f. Catches shall be: 1 Roller at All.

11. Tote Tray shall be white, high impact resistant polystyrene, with label holder permanently attached to face of tray. Supported by individual polycarbonate channels mounted to cabinet ends and partitions with two integral 5mm diameter pins and secured with one-euro style screw. Height adjustable on 32mm (1-1/4") centers.

12. Countertop Supports:

    a. Powder coated, formed metal supports. Must provide attachment points between countertop and wall.

PART 3 – EXECUTION

3.01 INSTALLERS

A. Installation shall be: by casework manufacturer's authorized representative.

3.02 INSTALLATION

A. Casework shall not be: installed until concrete, masonry, and drywall/plaster work is dry.

    1. If ambient conditions are not met at the time of requested delivery, the general contractor or owner must provide Case Systems a letter that releases manufacturer from any liability and responsibility from any warranty or damage resulting from not complying with required ambient conditions.

B. Casework shall be: installed plumb and true and is to be securely anchored in place.

C. The casework contractor shall verify all critical building dimensions prior to fabrication of casework.

D. Provide all labor for unloading, distribution, and installation of casework and related items as specified.

E. All casework shall be: securely anchored to horizontal wall blocking, not to plaster lathe or wall board.

F. The casework manufacturer shall re-configure the casework arrangements to dimensions requiring 2-1/2" or less of filler at each end of wall-to-wall elevations, and to ensure a complete and satisfactory installation.

G. The casework installer shall remove all debris, sawdust, scraps, and leave casework spaces clean.

H. All casework must be installed by casework installer plumb and level, adjust all doors, drawers and hardware to comply with manufacturers specifications and operate properly.

END OF SECTION

DIVISION 14 – CONVEYING EQUIPMENT

SECTION 142200 – HYDRAULIC ELEVATOR

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Hydraulic passenger elevator as shown and specified elevator work includes:

1. Commercial, standard pre-engineered hydraulic passenger elevator.
2. Elevator car enclosure, hoistway entrances and signal equipment.
3. Jacks
4. Operation and control systems.
5. Accessibility provisions for physically disabled persons
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
7. Materials and accessories as required to complete the elevator installation.
8. Required rated vestibule system or smoke door containment unit.

B. Related Sections:

1. Section 015000 – Temporary Facilities and Controls: Protection of floor openings and personnel barriers; temporary power and lighting.
2. Section 033000 – Cast-In-Place Concrete: Elevator pit, elevator motor and pump foundation, and grouting thresholds.
3. Section 042000 – Unit Masonry: Masonry hoistway enclosure, building-in and grouting hoistway door frames, grouting thresholds, Setting sleeves, inserts, and anchoring devices in masonry for guide-rail brackets.
4. Section 051200 – Structural Steel Framing: Support steel, divider beams, and hoist beams.
5. Section 055000 – Metal Fabrications: Pit ladder, divider beams, support for entrances and rails, hoisting beam at top of hoistway.
6. Section 071616 – Crystalline Waterproofing: Waterproofing of elevator pit when included.
7. Section 083343 – Overhead Coiling Smoke Curtains For Elevator Doors (for elevators without the required vestibule).
8. Section 096519 – Resilient Tile Flooring: Finished flooring in elevator cars.
9. Section 099000 – Painting
10. Division 23 – Heating, Ventilating, and Air Conditioning: Ventilation and temperature control of elevator equipment room.

11. Division 26 – Electrical: Electrical service to main disconnect in elevator machine room; electrical power for elevator installation and testing; electrical-disconnecting device to elevator equipment prior to activation of sprinkler system; electrical service for machine room; machine room and pit receptacles with ground-fault current protection; lighting in machine room and pit; wiring for telephone service to machine room. Emergency power supply, transfer switch and auxiliary contacts.

12. Section 310000 – Earthwork: Excavation for foundation.

1.02 REFERENCES

A. ANSI/ASME A17.1 – Safety Code for Elevators and Escalators.

B. ISO 9001-2000 – Quality Management Systems – Requirements.

1.03 DESIGN REQUIREMENTS

A. Arrange elevator components in machine room so equipment can be removed for repairs or replaced without dismantling or removing other equipment components.

1.04 SUBMITTALS

A. Comply with requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product data: Submit manufacturer/installer’s product data, including installation instructions.

C. Shop drawings: Submit manufacturer/installer’s shop drawings, including plans, elevations, sections, and details, indicating location of equipment, loads, dimensions, tolerances, materials, components, fabrication, fasteners, hardware, finish, options, accessories, and other information to render totally functional elevators.

1. Show equipment arrangement in the machine room, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.

2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.

3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.

4. Indicate electrical power requirements and branch circuit protection device recommendations.

D. Color selection: Submit color charts of exposed finishes and materials for color selection.

1. When requested, submit samples of exposed finishes and materials selected for the elevator system materials and components.

E. Certificates: Inspection and acceptance certificates and operating permits of elevator system installation. As required by authorities having jurisdiction for normal, unrestricted elevator use.

F. Operation and Maintenance Manual: Submit manufacturer/installer’s operation and maintenance manual; including operation, maintenance, adjustment, emergency and cleaning instructions; trouble shooting guide; renewal parts catalogs; and electrical wiring diagrams.

G. Warranty: Submit manufacturer/installer's standard warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer regularly engaged in manufacturing, installing, and servicing elevators of the type required for the project with a minimum of 5 years successful experience.

1. The manufacturer of the machine, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.

    a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.

2. The manufacturer shall have a documented, on-going quality assurance program.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than five years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:

1. Elevator design, clearances, construction, workmanship, materials, and installation, unless specified otherwise, shall be in accordance with ANSI/ASME A17.1, handicap accessibility, Americans with Disabilities Act, and other codes having legal jurisdiction.

2. ANSI/ASME A17.1 shall govern, except where codes having legal jurisdiction include more rigid requirements or conflict with ANSI/ASME A17.1.

3. Elevator shall follow design and manufacturing procedures certified in accordance with ISO 9001-2000 to meet product and service requirements for quality assurance for new products.

4. New York State Building Code.

5. NFPA 70 National Electrical Code.

6. NFPA 80 Fire Doors and Windows.

7. Americans with Disabilities Act - Accessibility Guidelines (ADAAG). ICC ANSI A117.1.

D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing 1 1/2 hour label by a Nationally Recognized Testing Laboratory.

E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.

1. Arrange for inspections and make required tests.

2. Deliver to the Owner upon completion and acceptance of elevator work.

F. Pre-installation Meeting:

1. Convene pre-installation meeting before start of installation of elevators.

2. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and elevator manufacturer/installer.

3. Review examination, installation, field quality control, adjusting, cleaning, protection, and coordination with other work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to site in manufacturer/installer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer/installer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer/installer's instructions.

C. Handling: Protect materials during handling and installation to prevent damage.

D. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises approved by the Owner's representatives.

E. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area.

1.07 PROJECT CONDITIONS

A. Temporary Electricity:

1. Electrical Contractor shall provide temporary 3-phase electricity to be available for installation of elevator components. Refer to Electrical Drawings.

B. Temporary Use:

1. Provide all necessary protection to prevent damage to each elevator used for construction purposes before Substantial Completion.

2. Provide temporary enclosures, coverings, guards, barriers and other devices required to protect the elevator car enclosures, hoistway entrances, signal fixtures and related materials, components and finishes from damage. Protective materials, methods and procedures shall be approved by the elevator manufacturer and paid for by the user.

3. Maintenance during use, including cleaning, lubricating and adjusting equipment and components for proper elevator operation shall be performed only by the elevator manufacturer. Cost for maintenance shall be paid by the user.

4. Elevators shall be free of damage or deterioration at time of Substantial Completion. Cost to repair damaged materials and finishes and replace worn or defective components to restore elevators to their original condition shall be paid by the user.

C. Painting:

1. Except as otherwise specified, paint all metal work provided by the elevator manufacturer and installer.

2. Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.

1.08 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 36 months from date of Substantial Completion.

1.09 MAINTENANCE SERVICE

A. Initial maintenance service: Beginning at Substantial Completion, provide 36 months full maintenance service by skilled employees of the elevator installer. Include periodic examination of the equipment and regular preventive maintenance, repair or replacement of work or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at a rated speed and capacity. Provide parts and supplies as used in the manufacturer of original equipment as required to keep the elevator(s) in proper operation.

   1. Perform maintenance, including emergency callback service, during normal working hours.

   2. Include 24-hour-per-day, 7-day-per-week emergency callback service.

      a. Response Time: Two hours or less

   3. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.

   4. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer or original equipment.

   5. Manufacturer shall have a service office and full time service personnel within a 50-mile radius of the project site.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from installer to owner, in the form of a standard 3 year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.10 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to project site in time for installation.

B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, and switches in pits and machine rooms.

C. Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays.

1.11 WORK BY OTHERS

A. This section includes the following work not performed by the Elevator Sub-Contractor.

   1. A hoistway, properly framed and enclosed, penthouse louver with motorized damper when required by code and indicated in the Construction Documents, a pit of proper depth provided with ladder, sump pump, sump pump pit, lights access doors, and waterproofing as required by the General Contractor. Machine room, adequate for the elevator equipment, including

floors, trap doors, gratings, foundations, lighting, ventilation, and heat to maintain the room at an ambient temperature of 50ºF minimum to 100ºF maximum, by the General Contractor, Electrical Contractor, and HVAC Contractor.

2. All sill supports, including steel angles where required, and sill recesses and the grouting of door sills. Finish walls after hoistway frames are installed, all by the General Contractor.

3. Proper trenching and backfilling for any underground piping or conduit, by the General Contractor.

4. Suitable connections from the power mains to each controller or motor generator set starter, signal equipment feeders as required, including necessary circuit breakers and fused mainline disconnect switches, lowering system defeat switch and circuiting by the Electrical Contractor.

5. Provide approved outlets as located on elevator layout and wiring to the car light and car light switch. Wiring from the alarm bell button in the car push-button bank to the alarm bell, a light and convenience outlet in the pit and at machine location, by the Electrical Contractor.

6. Wiring and conduit from life safety panel or any other monitor station to elevator machine room, by the Electrical Contractor.

7. Heat and smoke sensing devices at elevator lobbies on each floor with electrical conductors terminating at a properly marked panel in the elevator machine room, by the Electrical Contractor.

8. Telephone connection to elevator hoistway, by the Electrical Contractor.

9. Wiring from elevator hoistway to outside alarm bells required by the American National Standard Safety Code for Elevators (bell by Elevator Contractor), by the Electrical Contractor.

10. All painting, except as otherwise specified, by the General Contractor.

11. Elevator recall with adaptable relays by the Electrical Contractor.

12. Fire alarm sensors as shown on the electrical drawings.

13. Installation of guide rail brackets provided by Elevator Contractor and installed by General Contractor.

14. Hoistway steel beam including all anchoring provided and installed by the General Contractor.

15. Elevator cab finish flooring and wall base provided and installed by General Contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. For this product, this specification is based on an elevator as manufactured by: Schindler Elevator Corporation, PO Box 1935, Morristown, New Jersey 07962; www.us.schindler.com or equal.

B. Acceptable alternative manufacturers:

1. Thyssen Krupp
2. Canton
3. Otis

2.02 ELEVATOR SYSTEM AND COMPONENTS

A. Hydraulic Passenger Elevators: Model 330A.

B. Elevator Equipment Summary:

1.	Application:	Telescopic Holeless Dual Piston
2.	Service:	General Purpose Passenger – Class A Loading
3.	Quantity:	1 Unit
4.	Capacity:	2500 lbs
5.	Speed:	100 fpm
6.	Travel:	As indicated on Drawings
7.	Landings:	As indicated on Drawings
8.	Front Openings:	As indicated on Drawings
9.	Rear Openings:	0
10.	Operation:	Microprocessor Single Car Automatic Operation
11.	Machine Room:	Adjacent to elevator hoistway
12.	Platform Size:	7'-0” wide x 5'-1” deep
13.	Door Type:	Single Speed Side Opening
14.	Cab Height:	8'-0”
15.	Guide Rails:	Equivalent to 16 lb. per foot
16.	Hoistway Entrances:	3'-6” wide x 7'-0” high doors
17.	Power Supply:	208 Volts 3 Phase 60 Hz

C. Elevator Components:

1. Anti-stall feature.
2. Braille and audible signals.
3. Door open and close stall protection.
4. Emergency lighting.
5. Firefighter 's Service: Sensors as required.
6. Independent service feature.
7. Infrared light curtain door protection.
8. Low oil return.
9. Overload sensors.
10. Phase protection.
11. Soft Start Electronic Starting.
12. Elevator Management System Provisions.
13. Button Access Code.
14. Card Reader Provision.
15. Locking Service Panel in Car Operating Panel.
16. Power Unit Noise Reduction.
17. Pressure Switch.
18. Remote Monitoring Capable.
19. Battery powered lowering Rescue Feature.
20. Status Panel Indicator.
21. Telephone (ADA compliant).
22. Vandal Resistant Hall Fixtures.
23. Hall Call Lockout Key Switches – Provide for all floor buttons, switches to be momentary spring controlled.
24. Provision for a cab security camera system, Panasonic, Model WV-SW155, Low Profile Vandal Resistant Network Camera. Provisions to include necessary travel cable w/ Cat 6 connection. (Refer to Electrical Drawings for additional information).

2.03 MATERIALS, GENERAL

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.

B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

C. Steel:

1. Shapes and bars: ASTM A 36.
2. Sheet: ASTM A 366, cold-rolled steel sheet, commercial quality, Class 1, matte finish, stretcher leveled.
3. Finish: Factory-applied baked enamel.

D. Stainless steel:

1. Shapes and bars: ASTM A 276, Type 300 (18-8).
2. Tubing: ASTM A 269, Type 300 (18-8).

E. Bronze:

1. Drawn pipe: ASTM B 43, alloy UNS C23000, red brass.
2. Sheet: ASTM B 36, alloy UNS C28000, muntz metal.
3. Extrusions: ASTM B 455, alloy UNS C38500, architectural bronze.

F. Aluminum:

1. Sheet and plate: ASTM B 209, alloy 6063-T52.
2. Extrusions: ASTM B 221, alloy 6063-T52.

G. Nickel silver: ASTM B 151 extrusions, alloy UNS No. C74500, polished finish.

H. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.

I. Wood: Sliced veneer wood panels for walls

J. Glass: Clear laminated safety glass, complying with ANSI Z97.1, nominal 9/16" thickness.

2.04 HOISTWAY EQUIPMENT

A. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

B. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.

C. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

D. Guide Rails: Steel, omega shaped, fastened to the building with steel brackets.

E. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.

F. Guide Rail Lubricators: Provide a leak proof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.

G. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions. Design and size according to building code with safety factors.

H. Telescoping Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction.

1. Jack Cylinder: Two jacks, one located at each side of the car and mounted to the elevator car structure.

2. Synchronization of Jack Stages: Direct mechanical means to ensure elevator moves at steady speed and provides smooth ride.

I. Jack unit shall consist of the following components:

1. Heavy seamless steel tubing plunger accurately turned and polished.

2. Stop ring shall be electrically welded to the plunger to prevent plunger leaving the cylinder.

3. Internal guide bearing.

4. Packing or seal of suitable design and quality.

5. Drip ring around cylinder top.

6. Cylinder made of steel pipe and provided with a pipe connection and air bleeder.

7. Weld brackets to the jack cylinder for supporting the elevator on pit channels.

8. An auxiliary safety bulkhead shall be provided in the lower end of the cylinder.

9. Corrosion protection for the jack cylinder by encasing the entire length of the cylinder below ground with plastic auxiliary casing.

J. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.

K. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

L. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.

M. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.

N. Emergency Terminal Stopping Device: Provide emergency terminal stopping devices for speeds over 100 FPM. The emergency terminal stopping device shall operate independently of the normal terminal stopping device if it fails to slow down the car at the terminal as intended. Stopping devices shall not be prevented from functioning by a single short circuit caused by a combination of grounds or by other conditions.

1. Normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two or which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.

2.05 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:

1. Oil reservoir with tank cover and controller compartment with cover.

2. An oil hydraulic pump.

3. An electric motor.

4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.

D. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall comply with specified speeds and loads.

E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.

1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing backpressure more than 10 percent above that required to barely open the valve.

2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.

3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.

4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.

F. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.

G. Starting: Provide solid state.

2.06 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.

1. Manufacturer's standard entrance design consisting of 14 gauge frames with 2-inch (50 mm) profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.

2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.

3. Doors: Rigid flush panel construction with sound-deadening material.

a. Stainless steel: ASTM A 167, Type 300 stainless steel panels, No. 4 satin finish.

4. Frames: Securely fasten at corners to form unit frame. Frames shall be Bolted.

a. Stainless steel: ASTM A 167, Type 300 formed stainless steel sheet, No. 4 satin finish.

5. Transom: Stainless Steel

B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.

1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.

2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.

3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness

1. Aluminum: ASTM B 221 aluminum, mill finish.

2.07 CAR ENCLOSURE

A. Car Enclosure

1. Walls: Cab type DLP, durable wood core finished on both sides with high-pressure plastic laminate

2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Two coats factory applied reflective baked enamel.

3. Ceiling: Canopy ceiling, finished in #4 Stainless Steel With Down Lit Led Lighting. Provide lighting consisting of four compact fluorescent energy saving lights located in two semi-oval lateral cutouts located on the center-sides of the cab ceiling, Lexan lens cover.

4. Cab Columns, Front, and Transom: Stainless steel: ASTM A 167, Type 300 stainless steel panels, No. 4 satin finish.

5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.

    a. Door Finish: Stainless steel: ASTM A 167, Type 300 stainless steel panels, No. 4 satin finish.

    b. Cab Sills: Extruded, with grooved surface, 1/4-inch (6.4 mm) thickness.

        1) Aluminum: ASTM B 221 aluminum, mill finish.

6. Handrail: Cylindrical metal bar 1 ½" diameter stainless steel no. 4 finish. Provide at rear and side cab walls.

7. Ventilation: Single speed exhaust fan mounted on the car top.

8. Pad Buttons: Provide pad buttons on cab front(s) and walls.

    a. Provide one set of vinyl protection pads for the project.

9. Base: stainless steel no. 4

10. Finished Floor: Finished floor by General Contractor shall be similar or equal to VCT by Tarkett, or as indicated on drawings. Color as selected by Architect.

11. Provide certificate frame.

B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly.

2.08 DOOR OPERATION

A. Door Operation: Provide a direct current motor driven heavy-duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Direct drive geared operators, AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: Car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as the next car up.

2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.

4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a field programmable time, a buzzer will sound and the doors will close at reduced speed. If the infra-red door protection system detects a person or object while closing, the doors will stop and resume closing after the obstruction has been removed.

5. Limited Door Reversal: If the doors are closing and an infra-red beam is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.

6. Door Open Sentinel: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then open six times to try and correct the fault.

7. Door Close Sentinel: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then close six times to try and correct the fault.

8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

B. Door Protection Devices: Provide a door protection system using 40 microprocessor controlled infrared light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen. A mechanical reopening device is not acceptable.

2.09 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in stainless steel no. 4 integral swing return panel requiring no applied faceplate. The panel shall consist of a series of modules, inclined 20 degrees from vertical for optimum viewing and accessibility.

1. The lowest module shall contain the "door open," "door close," "alarm" buttons and a keyed "emergency stop" switch.

2. Intermediate modules shall contain floor buttons, which illuminate when a call is registered and remain illuminated until the call is answered. Raised floor indications and handicap symbols shall be located immediately adjacent to the floor buttons and be fully integrated in the module design. No applied symbols or floor indications or symbols on the buttons shall be permitted.

3. The next module shall contain required switches.

4. The top module shall contain fire service features in accordance with ASME A17.1, Rule 211.3, including operating instructions.

5. Include call buttons fore each landing served and other buttons, switches, and controls required for specified car operation.

6. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.

7. Mount controls at heights complying with the [the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."] [ICC A117.1]

8. Provide two car control stations in each passenger elevator; equip only one with required keyswitches, if any.

B. Position Indicator: An electronic dot matrix position indicator inclined 20 degrees from vertical and mounted in a module matching the control panel for optimum viewing. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing, which the elevator is stopped, or passing.

C. Emergency Light: An emergency light and capacity plate shall be integrated into a module inclined 20 degrees from vertical. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

D. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials pre-programmed number or monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery back-up power supply.

E. Auxiliary Operating Panel: not applicable in this application.

F. Column Mounted Car Riding Lantern: A car-riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

G. Special Accessories:

1. Independent service switch.
2. Inspection switch.
3. Two speed fan/light switch.
4. Telephone jack.
5. Certificate frame.
6. CCTV connection, utilizing CAT 6.
7. Momentary Key Switches for Hall Call Lockout.
8. Provision for a cab security camera system.

2.10 CONTROL SYSTEMS

A. Controller: The elevator control system shall be microprocessor based and software oriented and be linked together for purposes of communication by a serial communications link. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

1. Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered.

2. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed. The car shall not stop at floors where "down" buttons have been pressed, unless the stop for that floor has been registered by a car button or unless the down call is at the highest floor for which any buttons have been pressed. Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button or unless the up call is the lowest for which any button has been pressed.

3. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction. If both up and down calls are registered at an intermediate floor, only the call corresponding to the direction of car travel shall be canceled upon the stopping of the car at the landing.

B. Microprocessor: Locate the main microprocessor and car controller in the elevator machine room.

1. Microprocessor door operator shall reside in the door operator and control all functions of the elevator door(s).

2. Electronic selector shall reside on the car top and contain hall effect transducers that detect magnetic fields. Magnets, corresponding to floor positions and top/bottom of hoistway are mounted on a perforated metal tape that runs the length of the hoistway.

C. Group Operation: Not applicable in this application.

D. Provide a key operated switch in the elevator for the purpose of removing the car from normal operation. When the switch is in the "independent service" position, the elevator will bypass all landing calls and answer only car calls. The operator will have complete control over the operation of the car.

E. Emergency Power 10D-OC: In the event of a normal power supply failure, the elevator system shall be arranged to lower from an emergency power supply. The emergency power supply shall consist of a battery furnished by the elevator contractor. The elevator contractor shall provide circuitry so after normal power failure and establishment of emergency power, each elevator shall lower to a field adjustable return landing and park with the doors closed. If the designated return landing is above the current position, the elevator shall run down to the next lower landing and park with the doors closed.

2.11 HALL STATIONS

A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction. Faceplates shall be. Provide one set of risers.

1. Each terminal station shall contain one illuminating push button.

2. Each intermediate station shall consist of two illuminating pushbuttons, one for the up direction and one for the down position.

3. Phase 1 firefighters service key switch, with instructions, shall be incorporated into the hall station at the designated level.

B. Floor Identification Pads: Provide doorjamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. Hall Position Indicator: A dot matrix position indicator shall be provided and inclined 20 degrees from vertical and mounted in a module for optimum viewing. As the car travels, its' position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing which the elevator is stopped or passing. When hall lanterns are provided, the position indicator shall be combined with the hall lanterns in the same faceplate.

1. Hall Position Indicator.
2. Faceplates shall match hall stations.

D. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.

1. Provide units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.

2. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches (1829 mm) above finished floor.

3. Place lanterns in both jambs of entrance frame for each elevator. Mount at a minimum of 72 inches (1829mm) above finished floor.

   a. At manufacturer’s option, for single elevators or for only two cars in a group, lanterns may be located in car doorjambs instead of entrance jambs.

4. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

   a. At manufacturer’s option, audible signals may be placed on each car.

2.12 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.

B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.

C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch (25 mm) thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.

D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine hoistways, hoistway openings, pits, and machine rooms before starting elevator installation.

B. Verify hoistway, pit, machine room, and openings are of correct size, within tolerances, and are ready for work of this section.

C. Verify walls and sill supports are plumb, where openings occur.

D. Verify hoistway is clear and plumb, with maximum variation of 1/2" at any point.

E. Notify Architect in writing of dimensional discrepancies or other conditions detrimental to proper installation or performance of elevators.

F. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

G. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. Install elevator systems components and coordinate installation of hoistway wall construction.

1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.

2. Comply with the National Electrical Code for electrical work required during installation.

B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.

C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

D. Set jack unit-cylinder assembly plumb, centered accurately and shimmed to proper elevation, using centering lugs to prevent dislocation during filling. Fill space between casing and cylinder with clean, dry, compacted sand.

E. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn Parts. Comply with AWS standards for workmanship and for qualification of welding operators.

F. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

G. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

H. Sound isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and eliminate sources of structure-borne noise from the elevator system.

I. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

J. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascias and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.

K. Lubricate operating parts of system, including ropes, as recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by ANSI/ASME A17.1 latest version and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities 48 hours in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Adjust elevators for proper operation in accordance with manufacturer/installer's instructions.

B. Adjust elevators for smooth acceleration and deceleration of car so not to cause passenger discomfort.

C. Adjust doors to prevent opening of doors at landing on corridor side, unless car is at rest at that landing, or is in leveling zone and stopping at that landing.

D. Adjust automatic floor leveling feature at each floor to within 1/4 inch of landing.

E. Repair minor damages to finish in accordance with manufacturer/installer's instructions and as approved by Architect.

F. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.05 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

B. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.

1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required

for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.

2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the filed to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.07 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

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 221364 – ACID WASTE PIPING SYSTEMS

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 acid waste and vent piping system work, is indicated on drawings and schedules, and by requirements of this section.

B. Applications for acid 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.

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.

B. ANSI compliance - comply with applicable American National Standards pertaining to products and installation of acid waste piping systems.

C. PDI compliance - comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of acid waste piping systems.

1.04 SUBMITTALS

A. Product data - submit manufacturer's data for acid waste piping systems materials and products on the following:

1. Pipe and Couplings
2. Clean outs
3. Floor drains

B. Acceptable Manufacturers

1. Soil Pipe
   a. Flowserve or equivalent
   b. Zurn, Inc.

PART 2 – PRODUCTS

2.01 ACID 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 acid 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 high silicon cast iron with push-on gaskets. Compression Gaskets shall conform to the requirements of ASTM Standard C-518. Piping shall be encased in polypropylene acid resistant pipe.

B. Above Ground:

1. Service weight high siliconC.I. (Duriron) or Zurn polypropylene acid waste pipe and fittings with bell & spigot joints. Make: Flowserve, Zurn or equal.

2.04 BASIC PIPING SPECIALTIES

A. General - provide piping specialties complying with Division 22 Section 220300 – Basic Materials and Methods section "Piping Specialties", in accordance with the following listing:

1. Pipe escutcheons.
2. Mechanical sleeve seals.
3. Pipe sleeves.

2.05 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".

2.06 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 100’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 high silicon 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.

2. Wall Plate Cleanout:

a. Exposed installation: High silicon Cast iron ‘T’ branch cleanout tee with bronze tapered plug.
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.

3. Cleanout:

a. High silicon cast iron cleanout with straight body for caulking into soil pipe hub and fitted with bronze plug countersunk or raised head as required.

2.07 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 high silicon cast iron.

PART 3 – EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION

A. General - install plumbing identification in accordance with Specification Section 220553.

3.02 INSTALLATION OF ACID WASTE AND VENT PIPING

A. General - install acid 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. Insulate vent piping within three feet of passage through roof.

3.03 INSTALLATION DRAINAGE PIPING – ACID WASTE

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 acid waste "T-Y's".

D. Grade the "horizontal" piping 1/4" per foot, minimum for 3” and less, 1/8” per foot minimum for 4” and longer.

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 acid waste stacks (above the highest fixture drainage connection).
b. Offset in vent stacks.
c. Grade the “horizontal” piping 1/4" per foot, never less than 1/8” per foot.
d. Connect all plumbing fixtures into acid waste 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 one (1) foot above roof line.

I. Increase pipes smaller than 3" to 3" from 1 foot 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 "Piping Specialties".

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 "Supports and Anchors.

3.08 INSTALLATION OF DRAINAGE PIPING PRODUCTS

A. Cleanouts - install in acid waste above ground piping and acid waste 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 100' 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 acid 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 copper flashing.
2. Make watertight, allow for expansion and contraction.

B. Vent pipes

1. Extend not less than 12" from base of pipe, not less than 12" up 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. Stoneman "Stormtite" 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 acid waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Plumbing Code.

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 22 – PLUMBING

SECTION 226310 – NATURAL GAS PIPING

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of natural gas piping system work, is indicated on drawings and schedules, and by requirements of this section.

B. Applications for natural gas piping systems include the following:

1. Building distribution system from the riser to the gas meter header, through the gas pressure regulator to building and gas fired equipment connections.

1.02 SUBMITTALS

A. Product data - submit manufacturer's data for fuel gas piping systems materials and products on the following:

1. Piping.
2. Valves.
3. Pressure Regulators
4. Roof Pipe Support

1.03 QUALITY ASSURANCE

A. ANSI code compliance - fabrication and installation shall comply with applicable provisions of ANSI B31.2 "Fuel Gas Piping".

B. Automatic Gas valves shall comply with ANSI Z21.21. Gas pressure regulators shall comply with ANSI Z/21.80/CSA 6.22. Gas meters by utility company.

C. ASTM code compliance - steel pipe shall comply with applicable provisions of ASTM A53 "specifications for pipe, steel, black and hot dipped, zinc-coated welded and seamless."

D. Plastic pipe may be used underground only and shall comply with applicable provisions of ASTM D 2513-90b "specification for thermoplastic gas pressure pipe, tubing, and fittings," and installation shall be in accordance with ASTM D 2774-72 "standard practice for underground installation of thermoplastic pressure piping."

E. National fuel gas code compliance - comply with applicable provisions of NFPA 54 (ANSI Z223.1) "National Fuel Gas Code", New York State Fuel Gas Code and ANSI Z223.1a "Supplement to National Fuel Gas Code", NFPA 58 Liquified Petroleum Gas Code and local codes.

F. Local utility compliance - comply with requirements of local gas utility. Heating value is 1,000 BTU/cu ft., specific gravity 0.6.

G. Acceptable Manufacturers:

1. Black Steel Pipe.

a. Wheatland
b. Charlotte pipe

2. Pipe Unions

    a. Crane.
    b. Dart.
    c. Jefferson.

3. Dielectric Unions

    a. Hart Industries International, Inc.
    b. McDonald, A. Y. Mfg. Co.
    c. Watts Regulator Co.; a division of Watts Water Technologiies

4. Pipe Thread Compound

    a. Crane.
    b. Dixon.
    c. Rutland.

5. Gas Stops

    a. Mueller.
    b. Hays.
    c. Lunkenheimer.
    d. Equimeter.

6. Pressure Regulators

    a. As approved by the utility company.

PART 2 – PRODUCTS

2.01 NATURAL GAS PIPING MATERIALS AND PRODUCTS

A. General - provide piping materials and factory fabricated piping products as indicated. Where not indicated, provide proper selection. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Where more than one type of materials or products are indicated, selection is Installer's option.

B. Comply with Division 220553 section "Plumbing Identification Systems" for:

1. Building distribution piping - plastic pipe markers.
2. Gas valves - valve tags.
3. Gas service - underground type plastic line markers.

C. Piping specialties

1. Provide piping specialties complying with Division 15A Basic Materials and Methods section “Piping Specialties”, in accordance with the following listing:

    a. Pipe escutcheons.
    b. Pipe sleeves.
    c. Dielectric unions
    d. Sleeve seals.

D. Basic Supports and Anchors

1. General – provide supports and anchors complying with Division 22 Section 220300 – Basic Material and Methods section “Supports and Anchors”.

2.02 BASIC PIPE, TUBE AND FITTINGS

A. General - Comply with Division 22 Section 220300 – "Basic Materials and Methods" for pipe joining materials.

B. Gas service piping: (above ground)

1. All pipe sizes - black steel pipe.
2. Pipe weight - Schedule 40 complying with ASTM A53.

a. Screwed galvanized malleable iron fittings, class 150 for size 4" and smaller.
b. Fittings - wrought steel buttwelding, class 150 for sizes larger than 4”.

C. Gas service piping: (below ground)

1. Pipe sizes 1/2" through 12" - thermoplastic gas pressure pipe, tubing and fittings complying with ANSI/ASTM D 2513.

D. Building distribution piping:

1. Pipe size 4" and smaller - black steel pipe.

a. Pipe weight - Schedule 40, complying with ASTM A53.
b. Fittings - malleable iron threaded or socket welded.

2. Pipe sizes 5" and larger - black steel pipe.

a. Pipe weight - Schedule 40, complying with ASTM A53.
b. Fittings - wrought-steel buttwelding.

2.03 GAS VALVES

A. General - gas valves required for natural gas piping systems include the following types:

1. Gas cocks:

a. Gas cocks 4" and smaller - 150 psi non-shock WOG, bronze straightway body, bronze tapered plug, square head, lubricated, locking lever handle, threaded ends.
b. Gas cocks 5" and larger - 125 psi non-shock WOG, iron body straightway, square head, flanged ends, lubricated plug cock, tapered plug, washer and locking lever handle.

2. Safety Shut-Off Gas Solenoid Valves (Science Labs / where applicable)

a. Safety shut-off valves shall be normally closed aluminum body with BUNA N Seating, explosion-proof solenoid enclosure, UL FM approval, 80V DC operation. ASCO model Series 8215.
b. Each valve shall be equipped with a relay panel, 120V AC input, 80V DC output. ASCO Catalog No. 108D10C or equal.
c. Each valve and control panel for laboratory bench gas outlet use shall also be supplied with a control station with a mushroom push button (push to open) momentary contact and

a key operated switch. Control panel shall mount in the Instructors Laboratory Table or as indicated on drawings. Control station shall be ASCO Catalog No. 216c89 or equal.

B. Manufacturer - subject to compliance with requirements, provide gas cocks of one of the following:

1. Lunkenheimer Co.
2. Homestead Industries, Inc., Valve Div.
3. Equimeter.
4. Nordstrom Valves, Inc.
5. Mueller Co.
6. Kenotest Manufacturing Corp.

2.04 PRESSURE REGULATORS

A. Description: Regulators shall be a low pressure type designed for 10 psi maximum and an outlet pressure range from 0-28” water column, with threaded ends for 2 inch and smaller, flanged ends for 2-1/2” and larger, for inlet and outlet gas pressures, specific gravity and volume flow indicated.

B. Materials of Construction shall be:

1. Cast Iron Case.
2. Brass Valve Seat.
3. Synthetic Valve Washer.
4. Synthetic diaphragm.

C. Size as recommended by the manufacturer.

D. Make: Equimeter Model 143.

2.05 ROOF PIPE SUPPORTS

A. Description: A “roller-bearing” pipe support used to support roof mounted gas pipes. Design shall absorb thermal expansion and contraction of pipes and prevent damage to the roof membrane. Pipes shall rest on a nylon roller situated in a polycarbonate resin seat. Each pipe stand will accommodate up to 4 1/4" outside diameter pipes. The “U” shaped cradle shall keep the pipe stand roller system directly beneath the pipe without binding. Guide holes shall be provided at the top of the cradle for loose installation of an aluminum pipe strap using 1/2" #10 screws to prevent separation of the pipe from the support. The base shall be gently rounded to prevent gouging with edges raised 2" providing a platform whereby various elevations may be achieved by stacking several pipe stands one upon the other. Two 1/2" drainage ports shall be provided to prevent ponding within the device. Mount on 1/2" thick EPDM supplement roof protection pad.

B. Composition and Materials: The pipe stand shall consist of 3 major components. (1) A one-piece roof deck base, pipe support and roller housing composed of rigid poly carbonate plastics, and (2) A roller made of nylon which rests within the roller housing.

C. Make:

1. MIRO Industries roller bearing pipe support series RAH-12. Model used shall be based upon pipe size being supported.
2. Or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF NATURAL GAS 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 NATURAL GAS PIPING

A. General: Install in accordance with Division 22 Section 220300 – "Basic Materials and Methods".

B. Install in accordance with applicable codes and local utility company requirements. For buried gas service piping, prepare trench per General Provisions section. Install underground piping not less than 24" below finished grade.

C. Never run gas piping underground below building slab.

D. Use non-hardening sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly,and apply to only male threads of metal joints.

E. Remove cutting and threading burrs before assembling piping.

F. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.

G. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connections are completed.

H. Install drip legs in gas piping where indicated, and where required by code or regulation.

I. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

J. Use dielectric unions where dissimilar metals are joined together.

K. Install piping with .3" drop in 100' pipe run in direction of flow.

L. Install piping parallel to other piping, but maintain minimum of 12" clearance between gas piping and steam or hot water piping above 200 degrees F (93 C).

M. Exterior gas piping shall be fully painted using an exterior grade resin type paint, bright yellow.

3.03 ROOF PIPE SUPPORT INSTALLATION

A. To install the roller bearing pipe support, (1) center the pipe stand beneath the pipe so that the cradle allows the pipe to be squarely over and through the cradle of the pipe stand. (2) Set the pipe in the pipe stand without dropping or causing undue impact. An additional sheet of roofing material, a traffic pad, or a MIRO Deck Plate shall be installed beneath the pipe stand. For built-up roofs, all loose aggregate from an area 10" square should be removed from the area directly beneath the pipe stand and then follow the installation directions set forth above.

B. The pipe shall be secured to the pipe stand by using an aluminum Pipe Strap and #10 stainless steel screws in the guide holes at the top of each pipe stand. Note: allow sufficient room between the pipe and the strap to provide for free movement of the pipe without binding.

C. Pipe support spacing shall be 10 feet maximum on center. Each pipe stand shall be properly elevated to even load weight at all pipe stands.

3.04 GAS SERVICE INSTALLATION

A. Arrangements for gas service to building(s) shall be by the plumbing Contractor.

B. New rotary meter, pressure regulator and gas piping to building by plumbing contractor.

C. Comply with regulations of the local utility company.

3.05 WELDING

A. Conform to ANSI B31.8 Code for Pressure Piping - Gas Transmission and Distribution Piping Systems, 2-49.1 Safety in Welding and Cutting and utility regulations.

B. Pipe to be cleaned free of rust and scale, single be joint, bevel cut both ends.

C. Use backing rings on 5" pipe and larger.

D. Mitered pipe and field fabricated fittings not allowed.

E. Branch connections may be vee-butt welded directly to main without fittings provided two or more sizes smaller than main and branches not extending inside main.

3.06 INSTALLATION OF VALVES

A. Gas cocks - provide at connection to gas train for each gas fired equipment item, and on risers and branches where indicated.

B. Locate gas cocks where easily accessible and where they will be protected from possible injury.

C. Safety Shut-off Valves at Labs – furnish relay panel(Control Panel) and control station to electrical contractor for installation and Wiring. Plumbing contractor shall install solenoid valves in gas piping.

3.07 PIPING TESTS

A. Test, inspect and purge gas piping in accordance with Section 406 of the Fuel Gas Code, and local utility requirements.

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 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 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 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 232300 – REFRIGERATION PIPING SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specifications sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of refrigeration piping systems work is indicated on drawings and schedules, and by requirements of this section.

B. Applications for refrigeration piping systems include the following:

1. Refrigerant suction line piping between compressors and cooling coils.
2. Refrigerant liquid line piping between liquid receivers and cooling coils.
3. Refrigerant discharge line piping between compressors and condensers.
4. Refrigerant condenser drain line piping between condensers and liquid receivers.

C. Insulation for refrigeration piping is specified in applicable Division 23 sections, and is included as work of this section.

D. Refer to appropriate Division 23 sections for insulation required in connection with refrigeration piping, 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 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.

C. Refer to General Conditions Section GC31, "Submissions", for requirements pertaining to substitute materials and equipment.

D. Installer - a firm with at least 3 years of successful installation experience on projects with refrigeration piping system work similar to that required for project.

E. ANSI code compliance - comply with applicable provisions of ANSI B31.5, "Refrigeration Piping" and extend applicable lower pressure limits to pressures below 15 psig.

F. Safety code compliance - comply with applicable portions of ANSI/ASHRAE 15, "Safety Code for Mechanical Refrigeration".

G. Brazing - comply with applicable requirements of ANSI/ASME B31.5, "Refrigeration Piping", pertaining to brazing of refrigeration piping for shop and project site locations.

1.04 SUBMITTALS

A. Product data - submit manufacturer's data for refrigeration piping systems materials and products.

B. Brazing certification - certify brazing procedures, brazers and operators in accordance with ANSI/ASME B31.5.

C. Shop drawings - submit scaled layout drawings of installed refrigeration 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 REFRIGERATION 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 and manufacturer of equipment to comply with installation requirements. Provide materials and products complying with ANSI/ASME B31.5 Code for Refrigeration Piping where applicable, base pressure rating of refrigeration piping system maximum design pressures. Provide sizes and types matching piping and equipment connections, provide fittings of materials which match pipe materials used in refrigeration piping systems. Where more than one type of materials or products are indicated, selection is engineers' option.

2.02 BASIC IDENTIFICATION

A. General - provide identification complying with Division 23 Basic Materials and Methods section in accordance with the following listing:

1. Refrigeration piping - plastic pipe markers.

2.03 BASIC PIPE, TUBE AND FITTINGS

A. General - provide pipe, tube and fittings complying with Division 23 Basic Materials and Methods section "Pipe, Tube and Fittings", in accordance with the following listing:

1. Pipe size 2" and smaller - black steel pipe.

    a. Pipe weight - Schedule 40.
    b. Pipe weight - Schedule 80.
    c. Fittings - forged steel, socket welding.
    d. Fittings - wrought steel, buttwelding.

2. Pipe size 2 1/2" and larger - black steel pipe.

    a. Pipe weight - Schedule 40
    b. Pipe weight - Schedule 80.
    c. Fittings - wrought steel, buttwelding.

3. Tube size 3" and smaller - copper tube.

    a. Wall thickness - Type K, hard drawn temper.
    b. Wall thickness - Type L, hard drawn temper.
    c. Fittings - wrought copper, solder joints.

d. Joints - soldered, silver lead solder, ANSI/ASTM B 32, Grade 96 TS.
e. Joints - brazed, American Welding Society (AWS) classification BCuP-4 for brazing filler metal.

4. Tube size 4 1/8" and smaller - copper tube.

a. Wall thickness - type ACR, hard drawn temper.
b. Fittings - wrought copper, solder joints.
c. Joints - soldered, silver lead solder, ANSI/ASTM B 32, Grade 96 TS.
d. Joints - brazed, American Welding Society (AWS) classification BCuP-4 for brazing filler metal.

5. Tube size 3/4" and smaller - copper tube.

a. Wall thickness - type ACR, soft annealed temper.
b. Fittings - cast copper alloy for flared copper tubes.
c. Joints - flared.

6. Tube size 7/8" through 4 1/8" - copper tube.

a. Wall thickness - type ACR, soft annealed temper.
b. Fittings - wrought copper, solder joints.
c. Joints - soldered, silver solder, ANSI/ASTM B 32, Grade 96 TS.
d. Joints - brazed, American Welding Society (AWS) classification BCuP-4 for brazing filler metal.

2.04 BASIC PIPING SPECIALTIES

A. General - provide piping specialties complying with Division 23 Basic Materials and Methods section "Piping Specialties", in accordance with the following listing:

1. Pipe escutcheons.
2. Pipe sleeves.

2.05 BASIC SUPPORTS, ANCHORS AND SEALS

A. General - provide supports, anchors and seals complying with Division 23 Basic Materials and Methods section "Supports, Anchors and Seals", in accordance with the following listing:

1. Adjustable steel clevises, adjustable roller hangers, and adjustable pipe roll stands for horizontal piping hangers and supports.
2. Two bolt riser clamps for vertical piping supports.
3. Concrete inserts, C-clamps, and steel brackets for building attachments.
4. Protection shields for insulated piping support in hangers.
5. Copper flashings for piping penetrations.

2.06 SPECIAL REFRIGERATION VALVES

A. General - special valves required for refrigeration piping systems include the following types:

1. Globe and check valves:

a. Globe shutoff valves - forged brass, packed, back seating, winged seal cap, 300 degrees F (149 C) temperature rating, 500 psi working pressure.

b. Check valves - forged brass, accessible internal parts, soft synthetic seat, fully guided brass piston and stainless steel spring, 250 degrees F (121 C) temperature rating, 500 psi working pressure.

c. Available manufacturers - subject to compliance with requirements, manufacturers offering globe and check valves which may be incorporated in the work include, but are not limited to, the following:

d. Manufacturer - one of the following:

1) Henry Valve Co.
2) Parker Hannifin Corp, Refrigeration & Air Conditioning Div.
3) Sporlan Valve Co.

2. Solenoid valves:

a. 2-way solenoid valves - forged brass, designed to conform to ARI 760, normally closed, teflon valve seat, NEMA 1 solenoid enclosure, 24 volt, 60 Hz., UL listed, 1/2" conduit adapter, 250 degrees F (121 C) temperature rating, 400 psi working pressure.

1) Manual operator - provide manual operator to open valve.

b. Available manufacturers - subject to compliance with requirements, manufacturers offering solenoid valves which may be incorporated in the work include, but are not limited to, the following:

c. Manufacturer - one of the following:

1) Alco Controls Div. Emerson Electric Co.
2) Automatic Switch Co.
3) Sporland Valve Co.

2.07 REFRIGERATION ACCESSORIES

A. Refrigerant strainers - brass shell and end connections, brazed joints, monel screen, 100 mesh, UL listed, 350 psi working pressure.

B. Moisture liquid indicators - forged brass, single port, removable cap, polished optical glass, solder connections, UL listed, 200 degrees F (93 C) temperature rating, 500 psi working pressure.

C. Refrigerant filter driers - steel shell, ceramic fired desiccant core, solder connections, UL listed, 500 psi working pressure.

D. Refrigerant filter driers - corrosion resistant steel shell, steel flange ring and spring, wrought copper fittings, ductile iron cover plate with steel cap screws, replaceable filter drier core, 500 psi working pressure.

E. Evaporator pressure regulators - provide corrosion resistant, spring loaded, stainless steel springs, pressure operated, evaporator pressure regulator, in size and working pressure indicated, with copper connections.

F. Refrigerant discharge line mufflers - provide discharge line mufflers as recommended by equipment manufacturer for use in service indicated, UL listed.

G. Available manufacturers - subject to compliance with requirements, manufacturers offering refrigeration accessories which may be incorporated in the work include, but are not limited to, the following:

H. Manufacturer - one of the following:

1. Alco Controls Div. Emerson Electric Co.
2. Henry Valve Co.
3. Sporlan Valve Co.

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 REFRIGERATION PIPING

A. General - install refrigeration piping in accordance with Division 23 Basic Materials and Methods section "Pipe, Tube and Fittings", and in compliance with equipment manufacturer's recommendations.

3.03 INSTALLATION OF PIPING SPECIALTIES

A. Install piping specialties in accordance with requirements of Division 23 Basic Materials and Methods section "Piping Specialties".

3.04 INSTALLATION OF SUPPORTS, ANCHORS AND SEALS

A. Install supports, anchors, and seals in accordance with requirements of Division 23 Basic Materials and Methods section "Supports, Anchors and Seals".

3.05 INSTALLATION OF SPECIAL REFRIGERATION VALVES

A. General - install refrigeration valves where indicated, and in accordance with manufacturer's instructions. Remove accessible internal parts before soldering or brazing, replace after joints are completed.

1. Solenoid valves - install in refrigerant piping as indicated with stem pointing upwards.

a. Wiring of solenoid valves is specified in applicable Division 26 sections and is included as work of this section.
b. Wiring of solenoid valves is specified in applicable Division 26 sections, not work of this section.

3.06 INSTALLATION OF REFRIGERATION ACCESSORIES

A. Refrigerant strainers - install in refrigerant lines as indicated and in accessible location for service.

B. Moisture liquid indicators - install as indicated on refrigerant liquid lines, in accessible location.

C. Refrigerant filter dryers - install in refrigerant lines as indicated, and in accessible location for service.

D. Evaporator pressure regulators - install in refrigerant suction lines or evaporator outlets as indicated. Adjust, if required, for proper evaporator pressure.

E. Refrigerant discharge line mufflers - install as indicated, in horizontal or downflow portion of hot-gas lines, immediately after leaving compressor, not in riser.

3.07 EQUIPMENT CONNECTIONS

A. General - connect refrigerant piping to mechanical equipment in manner shown, and comply with equipment manufacturer's instructions where not otherwise indicated.

3.08 FIELD QUALITY CONTROL

A. Refrigerant piping leak test - prior to initial operation, clean and test refrigerant piping in accordance with ANSI B31.5, "Refrigeration Piping". Perform initial test with dry nitrogen, using soap solution to test all joints. Perform final test with 27" vacuum and then 200 psi using halide torch. System must be entirely leak free.

B. Repair or replace refrigerant piping as required to eliminate leaks and retest as specified to demonstrate compliance.

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 233101 – DUCT CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Removal and disposal of visible dirt, debris, and other contaminants.

2. Cleaning and decontamination of all supply, return and exhaust ductwork, diffusers, grilles and registers.

3. Chemical pressure washing and decontamination of all heating and cooling coils.

4. Cleaning and decontamination of dampers, supply air fans, exhaust air fans and other components of the HVAC systems.

5. Removal, disinfection, and/or sealing the supply duct lining with an anti-fungicidal coating as specified in the project drawings.

6. Verification and updating of working drawings.

1.02 SUBMITTALS

A. Product data for each product specified in this section.

B. Material safety data sheets for all products used.

C. Project Record Documents:

1. Upon completion of the project, submit one set of red-marked, duct layout drawings showing the location of all new access holes and openings installed in the duct systems to accommodate the cleaning process.

D. Qualifications, schedules and reports:

1. Qualification and experience documentation

2. Project schedule and procedures

3. Final report (3 copies)

E. Product-Data:

1. Submit manufacturer's data sheets, including Material Safety Data Sheets (MSDS) if applicable, for the following:

a. Air-tight plastic closure plugs
b. Vacuum cleaning machines and/or cleaning related equipment and accessories
c. Biocide sanitizing fluid
d. Anti-fungicidal duct work sealant
e. Others as applicable

1.03 QUALITY ASSURANCE

A. All work in this section shall be performed by an independent specialty HVAC duct cleaning contractor. The contractor shall be certified by NADCA (National Air Duct Cleaners Association). Submit information indicating qualifications and experience.

B. Conform to NFPA 90A

C. Conform to the requirements of the following standards that do not conflict with regulatory requirements or requirements of the contract documents:

1. SMACNA "HVAC Duct Construction Standards, Metal and Flexible."

2. NADCA "General Specifications for the Cleaning of Commercial Heating and Ventilation Systems."

D. Factory-Made Products - Listed by Underwriters Laboratories, Inc. (UL)

E. Video/photographic documentation before and after the cleaning process.

F. EPA registration for fungicide coating.

G. A project closing report shall be submitted upon completion of the entire cleaning project. Report shall include a dated summary of the duct systems and HVAC unit inspections and approvals by the Owner's designated representative. Project closing report shall be bound, neatly presented and organized according to HVAC unit, duct system or fan. Also include photographic documentation (min. 3" x 5" color prints) of before and after conditions of each system component or section.

1.04 FIELD MEASUREMENTS

A. Field measure related work to ensure proper fit and clearance.

B. Field measure existing work to ensure proper fit and clearance.

PART 2 – PRODUCTS

2.01 DUCT ACCESS PATCHES

A. Premanufactured sheet metal patches that are crossbroke, hemmed and predrilled, with insulation to match ductwork.

2.02 DUCT ACCESS DOOR

A. Premanufactured access door with locking seal.

2.03 DUCT SEALER

A. Product specifically rated for sealing duct work meeting NFPA requirements.

B. Seal modifications to existing ductwork in accordance with duct sealing described in SMACNA "HVAC Duct Construction Standards, Metal and Flexible."

2.04 HVAC DISINFECTANT/CLEANER

A. EPA registered formula for disinfection and cleaning of HVAC equipment equal to Foster Products 40-80.

B. Stabilized chlorine dioxide - Oxine or approved equivalent.

2.05 FUNGICIDAL PROTECTIVE COATING

A. EPA registered polyacrylate emulsion specifically formulated for long term fungicidal activity and HVAC application. Equal to Foster Products 40-20.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine elements and surface intended to support products.

B. Verify that each product conforms to regulatory requirements and to specification requirements.

C. Correct any unsatisfactory conditions before installing products of this section.

3.02 EQUIPMENT

A. HEPA filtered vacuum collector system capable of maintaining up to 1.0 inches of static pressure inside the isolated area of ductwork.

B. HEPA filtered wet/dry vacuums.

C. Air compressor as required.

1. The specific air or water pressure selected by the Contractor for air or water washing of various HVAC system components shall be appropriate to the item and component being washed. Water pressure utilized shall not exceed 1,000 psig.

2. Contractor shall repair or replace any system component damaged as a result of using excessive air or water pressure.

D. Rotary brush system for mechanical cleaning of ductwork.

3.03 PREPARATION

A. The location of each access hole or opening shall be shown and identified in a red- marked blue-lined print set of the duct system layout drawings.

B. Seal off ends and openings of any ductwork not being immediately worked on.

C. Isolate duct section to be worked upon, by using Protective seal barriers within the ductwork, to prevent loose dirt and debris from migrating to cleaned sections of the duct system.

D. Protect surrounding elements from damage and disfigurement resulting from work of this section.

E. Synthetic filter media (one inch thick 30% efficiency), or approved other, shall be temporarily fitted over each register, grille and diffuser in the duct system to intercept any migrating loose dirt and debris.

F. Each work area shall: be protected from being soiled with polyethylene plastic sheet. A protective sheet shall cover all furniture in each room of the work area. Furniture, in the case of laboratory rooms, shall, include all laboratory benches, fume hoods, desks, and related laboratory equipment. Upon completion of the duct system cleaning in each work area, protective sheeting shall be carefully removed with collected dirt and debris disposed of in an approved manner. Vacuum clean floors and other areas in each room restoring each room to its original clean condition.

G. Suitably support and brace any ductwork which will be entered by personnel.

3.04 SEQUENCE OF CLEANING AND DECONTAMINATING DUCTS

A. All work shall be conducted during unoccupied times and shall be coordinated with the designated owners' representative.

B. Take the fans off energy scheduling and allow them to run 24 hours except when the ductwork is being cleaned.

C. Clean the outside air intake grille and shaft.

D. Clean the return air ducts starting at the outer ends of the return air system and concluding at the mixed air chamber and the exhaust stack.

E. Clean the interior of the air handling unit. Remove and replace interior insulation at this time. Coordinate this work with mechanical drawings. Insulation replacement will not be required for new equipment.

F. Install products in compliance with manufacturer's instructions.

G. Pre-vacuum diffusers, grills and registers in the ductwork that are to remain. If necessary, remove, chemically wash/clean and reset (not required for existing diffusers to be replaced).

H. Existing ductwork and insulation shall be neatly cut as required to provide access to facilitate cleaning of the ductwork and components. As necessary, protect downstream areas from receiving particulates during the installation of access points.

I. Install vacuum collector unit at a predetermined location and clean the section of ductwork using omindirectional air nozzles and rotary brushes as necessary. Large crawlable ducts may be hand vacuumed or brushed and air washed.

J. Clean the supply ductwork starting from the supply fan and ending at the supply diffuser. At no point should uncleaned ductwork be upstream from clean ductwork.

K. Location of access holes and openings shall be approved by the Owner's designated representative.

L. Existing duct access panels shall be used wherever possible.

M. Upon completion of the cleaning operation, the round access openings shall be plugged air-tight with plastic caps designed for this purpose.

N. The rectangular access openings shall be closed using an overlapping galvanized sheet metal, or material to match existing ductwork, cover (cross broken) of the same gauge thickness as existing duct. Rectangular cover shall be fastened using self-tapping sheet metal screws with a silicone bead sealing gasket; or 3M No. 1202-T sealant tape used as a sealing gasket, at perimeter of cover. Seal all joints air-tight.

O. Where ducts are provided with exterior insulation, neatly cut and remove insulation as required to accommodate required duct access holes and openings. When complete, reinsulate at ducts at access points and install new vapor barriers to match existing.

P. Visually inspect the duct interior prior to cleaning each duct section. Use a fiber-optic borescope to accomplish the inspection task for all smaller ducts not otherwise accessible.

Q. Wash and vacuum clean each duct section:

Lined Ducts: Air pressure wash and vacuum or rotary brush and vacuum. The cleaning process shall not degrade the fiberglass insulation. Damaged insulation will be replaced or repaired at the discretion of the owners Representative.

1. Fog the interior of the ductwork with Oxine and allow to dry.

2. Upon completion of the cleaning of each fiberglass lined duct section, seal the surface of the fiberglass lined duct with Foster 40/20 or an approved white encapsulant equivalent.

Unlined Ducts: Air pressure wash and vacuum or rotary brush and vacuum. Hand wipe or hand vacuum if space allows. Fog the interior of the ductwork with Oxine and allow to dry.

R. Visually inspect each duct section using a borescope where necessary, to ensure the duct section is clean.

S. All registers, grilles and diffusers shall be removed, vacuum cleaned, washed and then reinstalled.

T. After duct section and reheat coils have been completely cleaned and sanitized, a final visual inspection, using a fiber-optic borescope as required, shall be accomplished with the Owner's designated representative for conditional approval. At this time, an owners' representative will take samples for mold contamination. The cleaning will receive final approval if the total fungal counts on a surface Rodac plate sample taken from the surface of the duct do not exceed 50 colony forming units on any plate. Verbal confirmation of the clearance surface sampling results will be given seven days after the final surface sample results are taken. If the desired cleaning effectiveness is not achieved, the area will have to be re-cleaned by the Contractor. The results of the cleaning effectiveness will be included in the final report. The cleaning contractor shall provide all ladders, lighting, fiber-optic borescope, and other miscellaneous equipment required to permit the owner's representative to inspect all portions of the project.

U. Repeat the cleaning process described above for succeeding duct sections until entire duct system is completely clean.

V. Reinsulate the exterior of the supply duct work if the interior insulation has been removed. Design sound attenuation modification if needed.

W. Verify that the building's air supply and return system is properly balanced.

X. Duct Access Doors:

1. A certified sheetmetal worker shall install all duct access doors.

2. Install duct access doors on the side of duct where adequate clearance is available.

3. Install duct access doors at other locations requiring access to duct interior for inspection, cleaning, adjusting, maintenance and operation.

4. Size: 18 inches by 16 inches unless duct is too small for this size.

Y. Install duct test holes as required.

3.05 CLEANING HVAC EQUIPMENT

A. Isolate HVAC unit housing from adjacent equipment and building room surfaces with polyethylene sheet.

B. Protect all motors, bearing assemblies, and belt drive assemblies within the HVAC unit housing with taped-on polyethylene sheet to prevent intrusion of potentially damaging wash water.

C. Carefully remove filters/filter media from holding frames and/or spools in an approved manner and store filters and protect from damage. Reinstall filter media after cleaning operation is complete, in accordance with filter manufacturer's instructions to insure a leak-free installation. Do not restart fans until all filters have been reinstalled and inspected by owner representative.

D. Insulation on the interior of the supply fan shall be removed and replaced with exterior insulation. Alternatively, IMCOA closed cell foam insulation or its approved equal may be applied to the interior of the supply fan.

E. Vacuum clean entire internal space of HVAC unit, including each component including component supports, frames, mounts, etc. contained therein, to remove loose dirt and debris.

F. Pressure wash, using an EPA approved cleansing agent, each HVAC unit. This shall include all the internal surfaces of the HVAC unit housing and all the internal components of the HVAC unit including fans, cooling and heating coil banks, filter bank support frames, and contiguous control damper assemblies.

G. Pressure washing of the heating and cooling coil banks shall be accomplished at both the upstream and downstream faces of the coils.

H. Where deemed necessary by the Cleaning Contractor, cleansing agent solution may be separately supplied prior to pressure wash.

I. Hand scrub where required to remove all residual dirt.

J. Rinse thoroughly with clear water to remove any residual dirt and cleansing agent.

K. Fan casings and impeller wheels shall be cleaned on all surfaces, inside and outside.

L. Vacuum clean all pressure washed surfaces. Vacuum collected wash water shall be disposed of outside of the HVAC unit.

M. A visual inspection of the HVAC unit, including all of its internal components shall be performed by the Owner's designated representative together with the Cleaning Contractor. At this time, an owner designated representative will take samples for mold contamination. The cleaning will receive final approval if the total fungal counts on a surface Rodac plate sample does not exceed 50 colony forming units on any plate. If the desired cleaning efficiency is not achieved, the area will have to be re-cleaned by the Contractor. Include this data in the final report.

3.06 APPLICATION OF FUNGICIDAL PROTECTIVE COATING

A. Apply fungicidal protective coating as per manufacturer's instructions with the HVAC system on interior fiberglass insulation that was previously cleaned and disinfected.

B. Do not coat coils, filters, controls or fans.

C. If the interior of a VAV box is encapsulated, the controls on the box must be protected from the encapsulant. The performance of the box must not be compromised by the duct cleaning.

3.07 FIELD QUALITY CONTROL

A. Inspect installed products to observe damage.

B. Test and demonstrate as required by the governing authority.

C. Do not allow discharge air from the fungicidal coating process to enter occupied spaces.

D. Ceiling and wall surfaces that are damaged by this work shall be replaced or repaired as required.

E. Testing, Adjusting and Balancing.

1. Secure all manual dampers at full open position.

2. Set splitters straight with the main duct.

3. Complete and clean the duct systems to prepare for testing, adjusting and balancing work.

F. FINAL PURGE

1. Work Area Preparation

a. Cover all terminal air outlets (diffusers, registers, grilles, etc.) with synthetic filter media at least 30% efficient. Tape filter to terminal device frame to eliminate air leakage.

2. Purge Procedure

a. Inform Owner's designated representative that outlets have been covered with synthetic filter media at least 30% efficient.
b. Insure all filters have been properly installed.

3. After receiving verbal confirmation about attainment of proper cleaning efficiency from an owner representative start HVAC units and in the event of variable speed/volume systems operate unit up and down between low and high speed to dislodge dirt and debris. Perform purge operation continuously for minimum of 1 hour.

4. Clean-Up:

a. Remove synthetic filter media from air terminal outlets, and wash and dry outlet frame with approved cleaning solution.
b. Vacuum and clean work areas to original condition.

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 233600 – AIR TERMINAL UNITS

PART 1 – GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

A. Extent of air terminal unit work is indicated on Drawings and Schedules, and by requirements of this section.

B. Types of air terminal units specified in this section include the following:

1. Variable air volume units.

C. Refer to HVAC Controls sections for field controls work.

D. Refer to Division 26 sections for power 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, installation and start-up instructions. Provide units of same manufacturer if various types of terminals required on same project.

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 units which have been tested and rated in accordance with AMCA Standards and bear AMCA Certified Rating Seal.

B. Provide water reheat coils which have been tested and rated in accordance with ARI and ASHRAE Standards and bear ARI Certified Rating Seal.

C. Provide units and electric reheat coils which have been listed and labeled by UL.

D. Provide units which have been listed and labeled by NFPA.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver units with factory installed packing and protective containers.

B. Handle units 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. while on project site before installation.

PART 2 - PRODUCTS

2.01 VARIABLE AIR VOLUME UNITS

A. General: Provide single or dual duct pressure independent variable air volume terminal units as scheduled, consisting of a variable volume damper and actuator or motor drive, adjustable air volume regulator, and other items as required for proper operation.

B. Casing: Provide zinc-coated steel casing 22MS gage minimum, hemmed, cross broken and reinforced to form a rigid unit.

1. Casing: With removable panels large enough to provide access to all moving parts, for inspection, adjustment, and maintenance, without disconnecting ducts.
2. Panels: Flush, gasketed airtight, and held in place by screwdriver operated latches or sheet metal screws.
3. Total leakage from casings: per ASHRAE 90.1

C. Lining Material: Provide lining materials in conformance with NFPA 90A and UL 181.

1. Inside surfaces: Lining material suitable to provide required acoustic performance, thermal insulation, and prevent sweating.
2. Lining thickness: Not less than 1/2-inch.
3. Lining: Secure to supporting surfaces in such a manner that it will not delaminate, sag, or settle.
4. Surfaces, including edges: Face with perforated metal or coated so that material is not detached by the air stream and protected on the cut edge.

D. Dampers: Provide dampers and other internal devices constructed of materials that cannot corrode and do not require lubrication or other periodic servicing.

1. Leakage Rates: Not exceeding 9 cfm when close-off pressure differential is 6 inches W.G.

E. Controls: Provide all interior controls factory furnished and installed. Provide factory installed external DDC damper actuators compatible with the building BMS.

F. Air Volume Controllers: Provide units with integral air volume controlling dampers to supply a variable volume of air to remote air supply diffusers through ductwork as indicated on the Drawings.

1. Static pressure independent maximum volume regulators: Field adjustable and calibrated in CFM (or have calibration charts) and field or factory adjusted to the quantities indicated on the Drawings.
2. Air volume: Varied in response to the demands of the thermostat in the conditioned space, or mounted in the unit if room air is induced over the thermostat (provide thermostat).

G. DDC Controls: Provide direct digital electronic controls (DDC) on terminals, including all necessary power supplies and accessories, which operate on 24 VAC or 24 VDC. Provide volume regulator settings from 0 percent of maximum volume to 100 percent of maximum terminal unit volume. Construct units to regulate air volume within plus or minus 1-1/2 percent of setting. Allow control adjustment from 65 to 85 degrees F., accurate to plus or minus 1.0 degrees F.

H. Reheat Coils: Provide variable volume units with one, two, three, or four row hot water or electric reheat coil, as indicated on drawing schedules.

1. Select coils for entering water temperature and capacity as shown on schedules.
2. Sequence of operation: As indicated on Drawings and Specifications.

I. Sound Attenuators: Provide integral sound attenuator to minimize downstream noise discharged to room.

J. Sound Ratings: Rate unit sound power in accordance with AHRI-885. Do not allow sound powers over the full throttling range of the unit to exceed the maximum sound powers listed on the Drawings.

K. Manufacturer: Subject to compliance with requirements, provide variable air volume units of one of the following:

1. Titus, Div. Tomkins Industries, Inc.
2. Trane Co.
3. Anemostat Products, Div. Dynamics Corp.
4. Carrier Corp.
5. Carnes Co., Div. of Wehr Corp.

PART 3 - EXECUTION

3.01 INSTALLATION OF AIR TERMINAL UNITS

A. General: Install units as indicated on the Drawings and in accordance with manufacturer's installation instructions. Coordinate work with other trades.

B. Supports: Provide units rigidly supported so that they remain stationary at all times.

3.02 FIELD QUALITY CONTROL

A. Testing: After installation of fans has been completed, test each unit 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.

3.03 BALANCING

A. Refer to Division 23 Section 230593, “Testing and Balancing" for air balancing of fan systems; not work of this section.

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 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 236000 – COMPRESSED AIR PIPING

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.

1.02 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment, tools and services, and perform all operations required in connection with or properly incidental to the construction of complete compressed air system to serve equipment and air outlets as indicated on the Drawings, and as required for a complete and functional system.

1.03 QUALITY ASSURANCE

A. Acceptable Manufacturers: Provide products complying with these specifications and produced by one of the following.

1. Schedule 40 steel pipe: Provide pipe manufactured by one of the manufacturer's listed in the latest edition of the American Petroleum Institute (API) approved manufacturer listing. All pipes shall include documentation of compliance with applicable ASTM and ANSI standards.

1.04 SUBMITTALS

A. Submissions shall be in accordance with Section 013300 – Submittal Procedures and as modified below.

B. Shop Drawing submittals shall include, but not be limited to, the following:

1. Submit manufacturer's data for compressor, filter dryer, and ancillary devices for the compressed air system.

2. Submit manufacturer's data for compressed air piping, materials and products.

3. Wiring Diagrams: For power, signal, and control wiring.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver compressed air piping system components in factory-fabricated water-resistant wrapping.

B. Handle compressed air piping system components carefully to avoid damage to material component, enclosure and finish.

C. Store compressed air piping system components in a clean, dry space and protect from the weather.

PART 2 - PRODUCTS

2.01 COMPRESSED AIR PIPE AND FITTINGS

A. Piping: All compressed air piping above grade shall be Schedule 40 steel pipe conforming to ASTM A-120 and ANSI B36.20. Fittings: Piping 2" and smaller shall be joined using Class 150 galvanized threaded fittings (ANSI B16.3). Thread sealing tape shall be used in all threaded connections. Copper pipe fittings shall be wrought copper brazed end fittings assembled using 95/5 tin-antimony or tin-silver solder.

2.02 VALVES AND TRIM

A. Ball Valves:

1. Ball valves shall be two-piece, full line size (full port) brass and reinforced seats and stuffing box rings. All ball valves shall be designed to permit repacking while the valve is in line. Valves shall be furnished with blowout proof stems.

2. Ball valves 2" and smaller shall be threaded body bronze or brass valves of a full port design. Valves shall be rated for 300 psi WOG and shall conform to Federal Specification WW-V-35B. Valves shall be similar to:

    a. Nibco No. T-585 Series
    b. Engineer approved equal.

3. Outlets: Provide a Lincoln 1/2in. filter /regulator/ lubricator combination model 85387-8 and ball valve at each pneumatic drop with a quick connect fitting.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE AND FITTINGS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size the pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. General: All piping, fittings and accessories shall be installed in strict accordance with the industry standard practice and applicable codes.

C. Pipe Slope: Slope all main piping to valved drain points.

D. Taps: Air drops from main piping shall rise vertically off of the main and then turn down so as to limit moisture carryover to the air drops. Mains shall be sloped 1/4" per 10 feet to drain legs with a valve and hose connection at the bottom of each drain leg.

E. Valves: Provide isolation (ball) valves in each tap from the system main and at each air outlet, equipment connection, at the base of each riser and at system drain points.

F. Equipment: Air lines routed to equipment furnished by other trades shall be extended to the equipment connection point and provided with a ball valve and suitable union (dielectric if dissimilar metals are involved). Coordinate final air connections to equipment with the installing trade.

G. Hangers and Supports: General: Provide supports, anchors and seals complying with Division 23 Basic Material and Methods section "Supports, Anchors, and Seals”.

3.02 CLEANING, FLUSHING AND INSPECTING

A. General: See Section 230300 – Basic Mechanical Materials and Methods.

3.03 TESTING AND BALANCING

A. General: See Section 230593 – HVAC Testing, Adjusting and Balancing.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION 238126 – SINGLE ZONE HEAT PUMP

PART 1 - GENERAL

1.01 SECTION INCLUDES

Single Zone Heat Pump Indoor Unit (Cassette – 4way) <LCN098HV4><LCN128HV4> <LCN188HV4><LCN248HV><LCN368HV><LCN428HV> (MANUFACTURER-LG)

A. Operating Conditions

1. The indoor unit shall be capable of the following ambient operating range.

a) Cooling: 57°F WB to 77°F WB

b) Heating: 59°F DB to 81°F DB

B. General

1. Unit shall be manufactured by LG.
2. Unit shall be factory assembled, wired, piped and run tested.
3. Unit shall be designed to be installed for indoor application.
4. Unit shall be designed to mount recessed in the ceiling and has a surface mounted concentric grille on the bottom of the unit.

C. Casing/Panel

1. Unit case shall be manufactured using galvanized steel plate.
2. The unit shall be provided with an off-white Acrylonitrile Butadiene Styrene (ABS) polymeric resin architectural grille.
3. The grille shall have a tapered trim edge, and a hinged, spring clip (screw-less) return air filter-grille door.
4. Unit shall be provided with metal ears designed to support the unit weight on four corners.
5. Ears shall have pre-punched holes designed to accept field supplied all thread rod hangers.

D. Cabinet Assembly

1. Unit shall have four supply air outlets and one return air inlet.
2. The supply air outlet shall be through four-directional slot diffusers each equipped with independent oscillating motorized guide vane designed to change the airflow direction.
3. The grille shall have a discharge range of motion of 40° in an up/down direction with capabilities of locking the vanes.
4. The unit shall have a guide vane algorithm designed to sequentially change the predominant discharge airflow direction in counterclockwise pattern.

5. Guide vanes shall provide airflow in all directions.
6. Unit shall be equipped with factory installed temperature thermistors for
    a) Return air
    b) Refrigerant entering coil
    c) Refrigerant leaving coil
7. Unit shall have a built-in control panel to communicate with the outdoor unit.
8. The unit shall have provision for fresh air ventilation through a knock-out on the cabinet.
9. The unit shall have factory designated branch duct knockouts on the unit case.
    a) The branch duct knockouts shall have the ability to duct up to half of the unit airflow capacity.
    b) The branch duct shall be ducted within the same room as the indoor unit.
10. Unit shall have the following functions as standard
    a) Self-diagnostic function
    b) Auto restart function
    c) Auto changeover function
    d) Dehumidifying function
    e) Forced operation
    f) Hot Start
    g) Sleep mode

E. Fan Assembly

1. The unit shall have a single direct driven turbo fan.
2. The fan shall be made of high strength ABS HT-700 polymeric resin.
3. The fan motor is Brushless Digitally controlled (BLDC) with permanently lubricated and sealed ball bearings.
4. The fan/motor assembly shall be mounted on vibration attenuating rubber grommets.
5. The fan speed shall be controlled using microprocessor based direct digitally controlled algorithm.
6. In cooling mode, the indoor fan shall have the following settings: Low, Med, High, Power Cool, and Auto.
7. In heating mode, the indoor fan shall have the following settings: Low, Med, High, and Auto.
8. The Auto fan setting shall adjust the fan speed to most effectively achieve the set-point.
9. Unit shall have factory installed motorized louvers to provide flow of air in up and down direction for uniform airflow.

F. Filter Assembly

1. The return air inlet shall have a factory supplied 14” x 14” x 1” <LCN098~188HV4> or 20.5” x 20.5” x 1” <LCN248~428HV> primary removable, washable filter.

2. The filter access shall be from the bottom of the unit.

G. Coil Assembly

1. Unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.

2. Unit shall have minimum of 2 rows of coils.

3. Unit shall have a factory supplied condensate drain pan below the coil.

4. Unit shall have an installed and wired condensate drain pump capable of providing minimum 27.5inch lift <LCN098~188HV4> or 31.5 inch lift <LCN248~428HV>, from bottom surface of the unit.

5. The drain pump shall have a safety switch to shut off the unit if condensate rises too high in the drain pan.

6. Unit shall have provision of 45° flare refrigerant pipe connections.

7. The coil shall be factory pressure tested at a minimum of 551 psig.

8. All refrigerant piping from outdoor unit to indoor unit shall be field insulated.

H. Microprocessor Control

1. The unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.

2. The unit shall be able to communicate with the outdoor unit using a field supplied minimum of 14 AWG, 4 conductor, stranded, shielded or unshielded power/communication cable. If shielded, it must be grounded to chassis at ODU only.

3. Central control shall be available through an optional control board for the outdoor unit.

4. Group control shall be available to allow multiple indoor units to operate from a single controller, or allow connection of more than one controller to an indoor unit.

5. The unit controls shall operate the indoor unit using one of the five operating modes:

   a) Auto changeover

   b) Heating

   c) Cooling

   d) Dry

   e) Fan only

I. Electrical

1. The unit electrical power shall be 208-230/1/60 (V/Ph/Hz)

2. The unit shall be capable of operating within voltage limits of +/- 10% of the rated voltage.

J. Controls

1. The indoor unit shall be supplied with a wireless handheld controller.
2. An optional wired controller shall be available as an additional accessory.
3. The indoor unit shall accommodate an optional Wi-Fi module as an additional accessory to allow monitoring and control through a smart device with the LG Smart ThinQ© application.

K. Warranty

1. Please refer to the respective outdoor unit for applicable warranty.

PART 2 - GENERAL

1.02 SECTION INCLUDES:

Outdoor Units (Single Zone Systems- Cassette/Ducted/VAHU)

1.02 **Single Zone Heat Pump Outdoor Unit (Cassette/Ducted/VAHU)** <LUU097HV><LUU127HV><LUU189HV><LUU249HV><LUU369HV><LUU429HV><LUU428HV> <LUU488HV> (MNUFACTURER LG)

L. Operating Conditions

1. The outdoor unit shall be capable of the following ambient operating range.

a) <LUU097HV><LUU127HV>

i. Cooling: 0°F DB to 118°F DB <with optional low ambient kit from -4°F DB to 118°F DB>

ii. Heating: -4°F WB to 64°F WB

M. General

2. Unit shall be manufactured by LG.
3. The air-conditioning system shall use R410A refrigerant.
4. Each system shall have one air source outdoor unit.
5. The refrigerant circuit shall be field piped to a single matching indoor unit to effectively and efficiently control the heating or cooling operation of the system.
6. All refrigerant piping from outdoor unit to indoor unit shall be field insulated.
7. Factory installed microprocessor controls in the outdoor unit and indoor unit shall perform functions to efficiently operate the single zone system and communicate via minimum 14 AWG, 4 conductor, stranded, shielded or unshielded power/communication cable. If shielded, it must be grounded to chassis at ODU only.
8. The outdoor unit shall be internally assembled, wired and piped from the factory.

9. The factory assembled system shall have the outdoor unit fitted with refrigerant strainer, check valves, oil separator, accumulator, 4-way reversing valve, electronic expansion valve, high side and low side refrigerant charging ports, and a service port.

N. Piping capabilities

10. The outdoor unit shall be capable of operating at an elevation of 49.2 feet <LUU097HV><LUU127HV> or 98.4 feet <LUU189HV><LUU249HV><LUU369HV><LUU429HV><LUU428HV><LUU488HV> above or below the indoor unit.

11. The outdoor unit shall be capable of operating with up to 66 feet <LUU097HV><LUU127HV>, 164 feet <LUU189HV><LUU249HV> or 246 feet <LUU369HV><LUU429HV><LUU428HV><LUU488HV> of total equivalent refrigerant piping length.

O. Defrost Operations

12. The outdoor unit shall be capable of auto defrost operation to melt accumulated ice off the outdoor unit heat exchanger. The defrost cycle control shall be based on outdoor ambient temperatures and outdoor unit heat exchanger temperatures.

13. An optional base pan heater shall be available for 9/12MBH outdoor units manufactured after 2/1/2018 and 18MBH+ outdoor units manufactured after 4/1/2017.

P. Oil Management

14. The outdoor unit shall have an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.

15. The outdoor unit shall have an oil separator to separate oil mixed with the refrigerant gas during compression and return oil to the compressor.

Q. Cabinet

16. The outdoor unit cabinet shall be made of pre-coated metal (PCM).

17. The front/side panels of the outdoor unit shall be removable type for access to internal components.

18. Outdoor unit cabinet shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours.

R. Fan Assembly

19. Each 3/4 to 2 ton outdoor unit <LUU097HV><LUU127HV><LUU189HV><LUU249HV> shall be equipped with one direct drive variable speed propeller fan with Brushless Digitally Controlled (BLDC) motor with a horizontal air discharge.

20. Each 3 to 4 ton outdoor unit <LUU369HV><LUU429HV><LUU428HV><LUU488HV> shall be equipped with two direct drive variable speed propeller fans with BLDC motors with a horizontal air discharge.

21. The fan blades shall be made of Acrylonitrile Butadiene Styrene (ABS) material.

22. The fan(s) shall be equipped with permanently lubricated bearings.

23. The fan motor(s) shall have variable speed to a maximum of 950 RPM.

24. The fan(s) shall have a raised guard to help prevent contact with moving parts.

S. Outdoor Coil

25. The outdoor unit shall have a factory built coil comprised of aluminum fins mechanically bonded on copper tubing.

26. The aluminum fins shall have factory applied corrosion resistant GoldFin™ material.

27. Coil coating shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours.

28. The outdoor unit coil shall be factory tested to a pressure of 600 psig.

29. The coil for each outdoor unit shall have a minimum of 14 Fins per Inch (FPI).

30. The coil for each outdoor unit shall have a 2 row heat exchanger.

31. The outdoor unit cabinet shall have a coil guard.

T. Compressor

32. The outdoor <LUU097HV><LUU127HV><LUU189HV><LUU249HV><LUU428HV><LUU488HV> unit shall be equipped with one hermetically sealed, digitally controlled, inverter driven twin-rotary compressor.

33. The inverter driven, digitally controlled compressor shall be capable of operating in a frequency range from 20 Hz to 100 Hz <LUU097~127HV>, with control in 1 Hz increments.

34. The inverter driven, digitally controlled compressor shall be capable of operating in a frequency range from 15 Hz to 80 Hz (Cooling), 15Hz to 100Hz (heating) <LUU189HV><LUU249HV>, with control in 1 Hz increments.

35. The compressor shall be mounted on vibration attenuating rubber grommets.

36. The compressor shall use a factory charge of Polyvinyl Ether (PVE) oil.

37. The compressor bearing(s) shall have Teflon™ coating.

38. The compressor shall be equipped with over-current protection.

U. Sound Levels

39. The outdoor unit shall have sound levels not exceeding 54 dB(A) tested in an anechoic chamber under ISO 3745 standard.

V. Sensors

40. The outdoor unit shall have

a) Suction temperature sensor

b) Discharge temperature sensor

c) High pressure sensor

d) Low Pressure sensor

e) Outdoor temperature sensor

f) Outdoor unit heat exchanger temperature sensor

W. Wind Load Installations for Outdoor Units

1. Provide Florida wind Load Installation Drawings that meet the requirements of the 2017 Florida Building Code, 6th Edition and ASCE Standard 7-2010 with submittal.

X. Warranty

1. Limited Warranty Period

   a) STANDARD FIVE (5) YEAR WARRANTY FOR A QUALIFIED SYSTEM - The Part(s) of a qualified System, including the compressor, are warranted for a period (the “Standard Parts Warranty Period”) ending five (5) years after the date of original installation. In absence of proof of installation the warranty date will end five (5) years from the date of manufacture.

   b) ADDITIONAL TWO (2) YEAR COMPRESSOR PART WARRANTY - The Compressor is warranted for an additional two (2) year period after the end of the applicable Standard Part Warranty Period (the “Compressor Warranty Period”).

2. Extended Warranty

   a) The Standard Warranty Period and the Compressor Warranty Period are extended to a total of ten (10) years (the “Extended Warranty Period”) for qualified Systems that have been (a) installed by a party that has completed the Training Requirements, (b) installation is pursuant to LG’s published instructions, and (c) product is registered within 60 days of startup at www.lg-dfs.com or www.lg-dfs-warranty.com..

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 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's standard catalog sheets, specifications, and installation instructions.

1.02 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 INSULATED CONDUCTORS AND CABLES

A. Date of Manufacture: No insulated conductor more than one year old when delivered to the site will be acceptable.

B. Acceptable Companies: General Cable Corporation., Cerro Wire & Cable Co. Inc., Prysmian Cables & Systems, or Southwire Co or equal.

C. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor. Conductor sizes No. 8 and larger shall be stranded. Conductors No. 10 and smaller shall be solid.

D. Types:

1. Electric Light and Power Wiring:

a. Minimum conductor size is No. 12 AWG, unless indicated otherwise.
b. General: Rated 600V, NFPA 70 Type THHN/THWN-2 or XHHW-2.
c. THHN/THWN-2 Gasoline and Oil Resistant: Polyvinylchloride insulation rated 600 V with nylon jacket conforming to UL requirements for type THHN/THWN-2 insulation, with the words "GASOLINE AND OIL RESISTANT II" marked thereon.
d. USE-2: Dual rated heat and moisture resistant insulation rated 600 V with jacket or dual-purpose insulation/protective covering conforming to UL requirements for type USE-2 service entrance cables.
e. Metal-Clad Cable, NFPA 70 Article 330 Type MC:

1) Interlocked flexible galvanized steel armor sheath, conforming to UL requirements for type MC metal clad cable. Aluminum armored type MC cable is NOT permitted.
2) Insulated copper conductors, suitable for 600 volts, rated 90°C, one of the types listed in NFPA 70 Table 310.13(A) or of a type identified for use in Type MC cable.
3) Internal full size copper ground conductor with green insulation.
4) Acceptable Companies: AFC Cable Systems Inc., Southwire, General Cable.
5) Connectors for MC cable: AFC Fitting Inc.'s AFC Series, Arlington Industries Inc.'s Saddle grip, or Thomas & Betts Co.'s Tite-Bite with anti-short bushings.

f. MI: AFC Cable Systems' Type MI Cable, or Pentair Pyrotenax Mineral Insulated System 1850 Pyrotenax Cable:

1) Copper conductors.
2) Seamless copper sheath.
3) Two hour fire resistive rating UL system classified, listed in UL Building Materials Directory product category Electrical circuit Protective Systems (FHIT), or Fire Resistive Cables (FHJR).
4) Fittings and accessories as required for a complete system to suit listing and installation conditions.

2. Class 1 Wiring:

a. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, NFPA 70 types KF-2, KFF-2, PAFF, PF, PFF, PGF, PGFF, PTFF, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF.
b. Larger than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with NFPA 70 Article 310.
c. Conductor with other types and thickness of insulation may be used if listed for Class 1 circuit use.

3. Class 2 Wiring:

a. Multiconductor Cables: NFPA 70 Article 725, Types CL2P, CL2R, CL2.
b. Other types of cables may be used in accordance with NFPA 70 Table 725.154(G) "Cable Substitutions", as approved.

4. Class 3 Wiring:

a. Single Conductors No. 18 and No. 16 AWG: Same as Class 1 No. 18 and No. 16 AWG conductors except that:

1) Conductors are also listed as CL3.
2) Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings.

b. Multiconductor Cables: NFPA 70 Article 725, Types CL3P, CL3R, CL3.
c. Other types of cables may be used in accordance with NFPA 70, Table 725.154(G) "Cable Substitutions", as approved.

2.02 CONNECTORS

A. General:

1. Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.

2. Connectors shall be UL 486 A listed, or UL 486 B listed for combination dual rated copper/aluminum connectors (marked AL7CU for 75 degrees C rated circuits and AL9CU for 90 degrees C rated circuits).

3. Use of Split-Bolt type connectors is NOT permitted.

B. Splices:

1. Spring Type:

    a. Rated 105° C, 600V: Buchanan/Ideal Industries Inc.'s B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+, or Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
    b. Rated 150° C, 600V: Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B or equal.

2. Indent Type with Insulating Jacket:

    a. Rated 105° C, 600V: Buchanan/Ideal Industries Inc.'s Crimp Connectors, Ideal Industries Inc.'s Crimp Connectors, Penn-Union Corp.'s Penn-Crimps, or Thomas & Betts Corp.'s STA-KON.

3. Indent Type (Uninsulated): Anderson/Hubbell's Versa-Crimp oer equal, VERSAtile, Blackburn/T&B Corp.'s Color-Coded Compression Connectors, Electrical Products Div./3M's Scotchlok 10000, 11000 Series, Burndy's Hydent, Penn-Union Corp.'s BCU, BBCU Series, or Thomas & Betts Corp.'s Compression Connectors or equal.

4. Connector Blocks: NIS Industires Inc.'s Polaris System, or Thomas & Betts Corp.'s Blackburn AMT Series or equal.

5. Resin Splice Kits: Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1, or Scotchcast Brand Resin Pressure Splicing Method or equal.

6. Heat Shrinkable Splices: Electrical Products Div./3M's ITCSN, Raychem Corp.'s Thermofit Type WCS, or Thomas & Betts Corp.'s SHRINK-KON Insulators or equal.

7. Cold Shrink Splices: Electrical Products Div./3M's 8420 Series or equal.

C. Gutter Taps: Anderson/Hubbell's GP/GT with GTC Series Covers, Blackburn/T&B Corp.'s H-Tap Type CF with Type C Covers, Burndy's Polytap KPU-AC, H-Crimpit Type YH with CF-FR Series Covers, ILSCO's GTA Series with GTC Series Covers, Ideal Industries Inc.'s Power-Connect GP, GT Series with GIC covers, NSI Industries Inc.'s Polaris System, OZ/Gedney Co.'s PMX or PT with PMXC, PTC Covers, Penn-Union Corp.'s CDT Series, or Thomas & Betts Corp.'s Color-Keyed H Tap CHT with HTC Covers or equal.

D. Terminals: Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics, Electrical Products Div./3M, Burndy, Ideal Industries Inc., Panduit Corp., Penn-Union Corp., Thomas & Betts Corp., or Wiremold Co. or equal

E. Lugs:

1. Single Cable (Compression Type Lugs): Copper, one- or 2-hole style (to suit conditions), long barrel; Anderson/Hubbell's VERSAtile VHCL, Blackburn/T&B Corp.'s Color-Coded CTL, LCN, Burndy's Hylug YA, Electrical Products Div./3M Scotchlok 31036 or 31145 Series, Ideal Industries Inc.'s CCB or CCBL, NSI Industries Inc.'s L, LN Series, Penn-Union Corp.'s BBLU Series, or Thomas & Betts Corp.'s 54930BE or 54850BE Series or equal.

2. Single Cable (Mechanical Type Lugs): Copper, one- or 2-hole style (to suit conditions); Blackburn/T&B Corp.'s Color-Keyed Locktite Series, Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Locktite Series or equal.

3. Multiple Cable (Mechanical Type Lugs): Copper, configuration to suit conditions; Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Color-Keyed Locktite Series or equal.

2.03 TAPES

A. Insulation Tapes:

1. Plastic Tape: Electrical Products Div./3M's Scotch Super 33+ or Scotch 88, Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.

2. Rubber Tape: Electrical Products Div./3M's Scotch 130C, or Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe or equal.

B. Moisture Sealing Tape: Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V or equal.

C. Electrical Filler Tape: Electrical Products Div./3M's Scotchfil, or Plymouth Rubber Co.'s Plymouth/Bishop 125 Electrical Filler Tape or equal.

D. Color Coding Tape: Electrical Products Div./3M's Scotch 35, or Plymouth Rubber Co.'s Plymouth/Bishop Premium 37 Color Coding or equal.

E. Arc Proofing Tapes:

1. Arc Proofing Tape: Electrical Products Div./3M's Scotch 77, Mac Products Inc.'s AP Series, or Plymouth Rubber Co.'s Plymouth/Bishop 53 Plyarc.

2. Glass Cloth Tape: Electrical Products Div./3M's Scotch 27/Scotch 69, Mac Products Inc.'s TAPGLA 5066, or Plymouth Rubber Co.'s Plymouth/Bishop 77 Plyglas.

3. Glass-Fiber Cord: Mac Products Inc's MAC 0527 or equal.

2.04 WIRE-PULLING COMPOUNDS

A. To suit type of insulation; American Polywater Corp.'s Polywater Series, Electric Products Div./3M's WL, WLX, or WLW, Greenlee Textron Inc.'s, Cable Cream, Cable Gel, Winter Gel, Ideal Industries Inc.'s Yellow 77, Aqua-Gel II, Agua-Gel CW, or Thomas & Betts Corp.'s Series 15-230 Cable Pulling Lubricants, or Series 15-631 Wire Slick or equal.

2.05 WIRE MANAGEMENT PRODUCTS

A. Cable Clamps and Clips, Cable Ties, Spiral Wraps, etc: Catamount/T&B Corp., or Ideal Industries Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install conductors in raceways after the raceway system is completed.

B. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors.

3.02 CIRCUITING

A. Do not change, group, or combine circuits other than as indicated on the drawings.

B. Do not change, group, or combine circuits other than as indicated on the drawings except as permitted under Section 260532 when reusing existing raceways.

3.03 SEPARATE NEUTRAL CONDUCTOR

A. Provide a separate neutral conductor for each circuit. Use of common neutral for multiple circuits is NOT permitted.

3.04 CONDUCTOR SIZE

A. Conductor Size:

1. For Electric Light and Power Branch Circuits: Install conductors of size shown on drawings. Where size is not indicated, the minimum size allowed is No. 12 AWG.

2. Light and Power homeruns shall be #12 AWG size, unless otherwise noted. Where Light and Power homeruns exceed 100 feet as measured to nearest outlet or switch to panelboard, the homerun shall be upsized to #10 AWG.

3. For Class 1 Circuits:

a. No. 18 and No. 16 AWG may be used provided they supply loads that do not exceed 6 amps (No. 18 AWG), or 8 amps (No. 16 AWG).
b. Larger than No. 16 AWG: Use to supply loads not greater than the ampacities given in NFPA 70 Section 310.15.

4. For Class 2 Circuits: Any size to suit application.

5. For Class 3 Circuits: Minimum No. 18 AWG.

3.05 COLOR CODING

A. General:

1. Color coding for electric light and power conductors shall be by continuous colored insulation as described below.

2. Large Conductors: Conductors of sizes No. 4 AWG and larger may be furnished with black insulation and color coded with Vinyl Color Coding Tape at all accessible points.

B. Color Coding for 120/208 Volt Electric Light and Power Wiring:

1. Color Code:

a. 2 wire circuit - black, white.
b. 3 wire circuit - black, red, white.
c. 4 wire circuit - black, red, blue, white.

2. White to be used only for an insulated grounded conductor (neutral). If neutral is not required use black and red, or black, red and blue for phase to phase circuits.

a. “White” for Sizes No. 6 AWG or Smaller:

1) Continuous white outer finish, or:
2) Three continuous white stripes on other than green insulation along its continuous length.

b. “White” for Sizes Larger Than No. 6 AWG:

1) Continuous white outer finish, or:
2) Three continuous white stripes on other than green insulation along its continuous length, or:
3) Distinctive white markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install white color-coding tape at terminations, and at 1’ 0” intervals in gutters, pull boxes, and manholes.

3. Colors (Black, Red, Blue):

a. For Branch Circuits: Continuous color outer finish.
b. For Feeders:

1) Continuous color outer finish, or:
2) Color coding tapes encircling the conductors, installed on the conductors at time of their installation. Install color coding tapes at terminations, and at 1’ 0” intervals in gutter, pull boxes, and manholes.

C. Color Coding For 277/480 Volt Electric Light and Power Wiring:

1. Color Code:

a. 2 wire circuit – brown, gray.
b. 3 wire circuit – brown, yellow, gray.
c. 4 wire circuit – brown, yellow, orange, gray.

2. Gray to be used only for an insulated grounded conductor (neutral). If neutral is not required use brown and yellow, or brown, yellow and orange for phase-to-phase circuits.

a. “Gray” For Sizes No. 6 AWG or Smaller.

1) Continuous gray outer finish.

b. “Gray” For Sizes Larger Than No. 6 AWG:

1) Distinctive gray markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install gray color-coding tape at terminations, and at 1’ 0” intervals in gutters, pull boxes, and manholes.

c. Colors: (Brown, Yellow, Orange)
d. For Branch Circuits: Continuous color outer finish.
e. For Feeders:

1) Continuous color outer finish, or:
2) Color coding tapes encircling the conductors, installed on the conductors at the time of their installation. Install color coding tapes at terminations, and at 1’ 0” intervals in gutters, pull boxes, and manholes.

D. More Than One Nominal Voltage System Within A building: Permanently post the color-coding scheme at each branch-circuit panelboard.

E. Existing Color-Coding Scheme: Where an existing color-coding scheme is in use, match the existing color coding if it is in accordance with the requirements of NFPA 70.

F. Color Code for Wiring Other Than Electric Light and Power: In accordance with ICEA standard S-73-532 (NEMA WC57-2004). Other coding methods may be used, as approved.

3.06 WIRE MANAGEMENT

A. Use wire management products to bundle, route, and support wiring in junction boxes, pull boxes, wireways, gutters, channels, and other locations where wiring is accessible.

3.07 EQUIPMENT GROUNDING CONDUCTOR

A. Install equipment grounding conductor:

1. Provide an equipment grounding conductor for all circuits. Raceways shall not be relied upon as an equipment grounding conductor.
2. Where multiple circuits are grouped in a common raceway, a single equipment ground sized as per Code may be permitted.
3. Equipment grounding conductor shall be sized in accordance with the Contract Drawings. Where no size is indicated, provide minimum size equipment ground required by the Code.
4. Where conductors are upsized to account for voltage drop, the equipment grounding conductor shall be proportionally upsized per Code, whether or not indicated on the drawings.

B. Equipment grounding conductor is not intended as a current carrying conductor under normal operating circumstances.

C. Color Coding For Equipment Grounding Conductor:

1. Color Code: Green.

2. “Green” For sizes No. 6 AWG or Smaller:

   a. Continuous green outer finish, or:
   b. Continuous green outer finish with one or more yellow stripes, or:
   c. Bare copper (see exception below).

3. “Green” For Sizes Larger Than No. 6:

   a. Stripping the insulation or covering from the entire exposed length (see exception below).
   b. Marking the exposed insulation or covering with green color-coding tapes.
   c. Identify at each end and at every point where the equipment grounding conductor is accessible.

3.08 ARC PROOFING

A. Where indicted on the drawings, arc proof feeders installed in a common pull box or manhole as follows:

1. Arc proof new feeders.

2. Arc proof existing feeders that are spliced to new feeders.

3. Arc proof each feeder as a unit (except feeders consisting of multiple sets of conductors).

4. Arc proof feeders consisting of multiple sets of conductors by arc proofing each set of conductors as a unit.

5. Arc proof feeders with half-lapped layer of 55 mils thick arc proofing tape and random wrapped or laced with glass cloth tape or glass-fiber cord. For arc proofing tape less than 55 mils thick, add layers to equivalent of 55 mils thick arc proofing tape.

3.09 INSULATED CONDUCTOR AND CABLE SCHEDULE - TYPES AND USE

A. Electric Light and Power Circuits:

1. Type THHN/THWN-2 or XHHW-2. : Wiring in dry or damp locations (except where special type insulation is required).

2. THHN/THWN-2, XHHW-2, or USE-2: Wiring in wet locations (except where type USE-2 insulated conductors are specifically required, or special type insulation is required).

3. THHN/THWN-2: Wiring installed in existing raceway systems (except where special type insulation is required).

4. THHN/THWN-2 or XHHW-2: Wiring for electric discharge lighting circuits (fluorescent, HID), except where fixture listing requires wiring rated higher than 90° C.

5. THHN/THWN-2 Marked “Gasoline and Oil Resistant”: Wiring to gasoline and fuel oil pumps.

6. USE-2: Wiring indicated on the drawings to be direct burial in earth.

7. USE-2 Marked “Sunlight Resistant”:

    a. Service entrance wiring from overhead service to the service equipment.
    b. Wiring exposed to the weather and unprotected (except where special type insulation is required).

8. MC:

    a. Use of MC cable may be used in lieu of individual conductors in conduit, subject to the provisions of the NFPA 70 where run concealed above suspended ceilings and stud walls
    b. Branch circuit wiring in wood framed construction (wood joists and wood stud partitions):

        1) Install conductors parallel with joists or studs and attach to the side of these timbers by galvanized straps spaced not more than 6 feet apart.
        2) Install conductors through holes bored in the center of the timbers when running at right angles to joists or studs.
        3) Do not attach the conductors to the edge of joists or studs.

    c. Branch circuit wiring in movable metal partitions and movable gypsum partitions.

        1) Install conductors in accordance with partition manufacturer’s recommendations.

    d. Branch circuit wiring in metal stud partitions:

        1) Install conductors parallel with studs and attach to the side by galvanized straps spaced not more than 6 feet apart.
        2) Install conductors through holes bored in the center of the metal member when running at right angles to studs.

a) Conductors shall be protected by listed bushings or listed grommets covering all metal edges.

3) Do not attach the conductors to the edge of studs.

e. Concealed Above Ceilings: Subject to the provisions of NFPA 70. Support MC cable from building structure. Mc cable shall not be permitted to be supported by the ceiling grid.

9. MI:

a. Wiring for underplaster extensions.
b. Wiring in areas where indicated on drawings.
c. Where MI cable is installed in areas subjecting cable to corrosion, use PVC or HDPE jacketed MI cable (nonmetallic jacketed cable is not suitable for use in ducts, plenums or other spaces used for environmental air).

3.10 CONNECTOR SCHEDULE - TYPES AND USE

A. Temperature Rating: Use connectors that have a temperature rating, equal to, or greater than the temperature rating of the conductors to which they are connected.

B. Splices:

1. Dry Locations:

a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors, indent type pressure connectors with insulating jackets, or connector blocks (except where special type splices are required).
b. For Conductors No. 6 AWG or Larger: Use connector blocks or uninsulated indent type pressure connectors. Fill indentions in uninsulated connectors with electrical filler tape and apply insulation tape to insulation equivalent of the conductor or insulate with heat shrinkable splices or cold shrink splices.
c. Gutter Taps in Panelboards: For uninsulated type gutter taps fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor or insulate with gutter tap cover.

2. Damp Locations: As specified for dry locations, except apply moisture sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices or cold shrink splices are used).

3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits, cold shrink splices or heat shrinkable splices. Exception: Splices above ground which are totally enclosed and protected in NEMA 3R, 4, 4X enclosures may be spliced as specified for damp locations.

C. Terminations:

1. For Conductors No. 10 AWG or Smaller: Use terminals for:

a. Connecting wiring to equipment designed for use with terminals.

2. For Conductors No. 8 AWG or Larger: Use compression or mechanical type lugs for:

a. Connecting cables to flat bus bars.
b. Connecting cables to equipment designed for use with lugs.

3. For Conductor Sizes Larger Than Terminal Capacity On Equipment: Reduce the larger conductor to the maximum conductor size that terminal can accommodate (reduced section not longer than one foot). Use compression or mechanical type connectors suitable for reducing connection.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 260526 – GROUNDING AND BONDING

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

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.

1.03 SUBMITTALS

A. Product Data: Manufacturer's standard catalog cuts for each type of product indicated.

B. Product Data: For the following:

1. Ground rods.
2. Grounding clamps & connectors

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

D. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a Nationally Recognized Testing Agency (NRTL) acceptable to authorities having jurisdiction and marked for intended use.

1. Comply with UL 467.

2. Comply with NFPA 70.

3. For overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

4. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

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:

1. Burndy Corp.
2. Cadweld Div.; Erico Product, Inc.
3. Erico International Corporation
4. ILSCO
5. Joslyn Corp.
6. OZ Gedney Div.; General Signal Corp.
7. Thomas and Betts Corp.
8. Thompson Lightning Protection Corp.

2.02 GROUNDING CONDUCTORS

A. Insulated conductors, comply with Section 260519.

B. Material: Aluminum, copper-clad aluminum, and copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Assembly of Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

G. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.03 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.04 GROUNDING ELECTRODES

A. Ground Rods: Pointed, Copper-clad steel.

1. Size: 3/4 x 120 inches

B. Test Wells: Where indicated, provide handhole as specified in Division 2 Section "Underground Ducts and Utility Structures."

PART 3 - EXECUTION

3.01 APPLICATION

A. In raceways, use insulated equipment grounding conductors.

B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

C. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

D. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

E. Underground Grounding Conductors: Use copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade or bury 12 inches (300 mm) above duct bank when installed as part of the duct bank.

3.02 SERVICE GROUNDING

A. Provide a grounding electrode conductor, sized in accordance with the drawings or NFPA 70, connected to the neutral bus at the service disconnecting means and the opposite end connected to a listed grounding electrode.

B. Equipment grounding conductors shall be connected to the ground bus at the service disconnecting means.

C. Comply with NEC and local utility grounding requirements.

3.03 SEPARATELY DERIVED SYSTEM GROUNDING

A. Separately derived systems shall include, but are not limited to:

1. Transformers (exception: autotransformers)
2. Generators (where neutral is switched)
3. UPS systems when so configured.

B. Comply with NFPA 70.

C. A grounding electrode conductor, sized per the drawings or NFPA 70, shall be provided between the separately derived system grounded conductor and grounded metal frame or metal structural member. This connection shall be made at the source grounded conductor bus or at the first disconnecting means subject to the provisions of NFPA 70.

D. Provides system bonding jumper, sized per drawings or NFPA 70 between the system grounded conductor bus and the equipment ground bus.

E. There shall be no further connections between the grounded conductor and equipment ground downstream (load side) of the connection.

3.04 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all new feeders and branch circuits. Reliance solely on metallic raceways for equipment grounding means is NOT permitted.

C. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

D. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.

E. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

F. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6.4- by-50-by-300-mm) grounding bus.

2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

G. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

3.05 INSTALLATION

A. Ground Rods: Install ground rods per NEC and utility requirements.

1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds. Make connections without exposing steel or damaging copper coating.

3. Ground rods shall be installed in undisturbed earth.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

H. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

3.06 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.07 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Section 310000. Maintain restored surfaces. Restore disturbed paving as indicated.

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-900 (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-3000 (1-3/8 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).

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 REFERENCES

A. NFPA, NEMA, ANSI, 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 RACEWAYS

A. Rigid Ferrous Metal Conduit (a/ka 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 Allied Tube & Conduit Corp., Republic Conduit, or Wheatland Tube Co or approved equal.

B. Electrical Metallic Tubing (EMT):

1. Comply with UL 797 and ANSI C80.6.

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 Allied Tube & Conduit Corp Republic Conduit, 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 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 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., Carlon/Div. Of Lamson and Sessions, Ipex Inc., National Pipe & Plastics Inc., or Queen City Plastics Inc or approved equal.

F. Surface Metal Raceway, Fittings and Accessories:

1. Comply with UL 5. By Thomas & Betts Corp., Mono-Systems Inc. or Wiremold Co.

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, Cooper/Crouse-Hinds' 1031 Series, OZ/Gedney Co.'s IBC-50 Series, Raco Inc.'s 1132 Series, Steel City/T & B 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, Cooper/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 (T & B Corp.'s) 50 BB, 75 BB, Cooper/Crouse-Hinds' 931,932, or OZ/Gedney Co.'s IB-50, IB-75, Raco Inc.'s 1402, 1403, Steel City/T & B Corp.'s BU-501, BU-502, or Thomas & Betts Corp.'s 222, 223 or approved equal.

2. 150 degrees C temperature rating; Appleton Electric Co.'s BBU50H, BBU75H, Cooper/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, Cooper/Crouse-Hinds' GLL Series, OZ/Gedney Co.'s IBC-50L Series, Raco Inc.'s 1212 Series, Steel City/T & B Corp.'s BG-801 (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, Cooper/Crouse-Hinds' HGLL Series, or OZ/Gedney Co.'s IBC-50L Series, or Thomas & Betts Corp.'s 3870or approved equal.

D. Connectors and Couplings:

1. Locknuts: UL, steel/zinc electroplate; Appleton Electric Co.'s BL-50 Series, Cooper/Crouse-Hinds' 11 Series, OZ/Gedney Co.'s 1-50S Series, 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, 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; Allied Tube & Conduit Corp.'s Kwik-Couple, Appleton Electric Co.'s EC-50 Series, Cooper/Crouse-Hinds' 190M Series, OZ/Gedney Co.'s 4-50 Series, Raco Inc.'s 1502 Series, Steel City/T & B Corp.s EK-401 Series, or Thomas & Betts Corp.'s 675 Series.

5. Electrical Metallic Tubing Couplings and Insulated Connectors: Set screw type fittings are not permitted. Provide Compression type, steel/zinc electroplate; Appleton Electric Co.'s TW-50CS1, TWC-50CS Series, Cooper/Crouse-Hinds' 1650, 660S Series, Raco Inc.'s 2912, 2922 Series, Steel City/T & B Corp.'s TC-711 Series, or Thomas & Betts Corp.'s 5120, 5123 Series or approved equal.

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, Cooper/Crouse-Hinds' LTB Series, OZ/Gedney Co.'s 4Q-50T Series, Raco Inc.'s 3512 Series, Steel City/T & B 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, Cooper/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: Cooper/Crouse-Hinds' XJG (XJG-EMT for EMT), or Thomas & Betts Corp.'s XJG, with internal grounding or approved equal.

G. Deflection Fittings: Appleton Electric Co.'s DF, Cooper/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 ther 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, Cooper/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 Textron Inc.'s Poly Line 430, 431, or Ideal Industries Powr-Fish Pull-Line 31-340 Series.

PART 3 - EXECUTION

3.01 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 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 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 3/4-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 3/4-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 3/4-inch conduits, bends may be made with manual benders. For all conduit sizes larger than 3/4 inch, manufactured or field fabricated offsets or bends may be used. Make field fabricated offsets or bends with an approved hydraulic bender.

3.02 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.

3.03 RACEWAY SCHEDULE

A. Rigid Ferrous Metal Conduit: Install in all locations unless otherwise specified or indicated on the drawings.

B. Electrical Metallic Tubing:

1. May be installed concealed as feeder or branch circuit conduits above suspended ceilings where conduit does not support fixtures or other equipment.

2. May be installed concealed as feeder or branch circuit conduits in hollow areas in dry locations, including:

   a. Hollow concrete masonry units, except where cores are to be filled.
   b. Drywall construction with sheet metal studs, except where studs are less than 3-1/2 inches deep.

3. May be installed exposed as feeder or branch circuit conduits in dry, unfinished, non-hazardous locations.

C. Flexible Metal Conduit: Install equipment grounding conductor in the flexible metal conduit and bond at each box or equipment to which conduit is connected:

1. 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.

2. Use 1 to 3 feet of flexible metal conduit for final conduit connection to:

   a. Emergency lighting units.
   b. Dry type transformers.
   c. Motors with open, drip-proof or splash-proof housings.
   d. Equipment subject to vibration (dry locations).
   e. Equipment requiring flexible connection for adjustment or alignment (dry locations).

3. 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.

4. 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.

D. 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:

1. 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:

   a. Motors with weather-protected or totally enclosed housings.
   b. Equipment subject to vibration (damp and wet locations).
   c. Equipment requiring flexible connection for adjustment or alignment (damp and wet locations).

E. Rigid Nonmetallic PVC Conduit:

1. Schedule 40 or Schedule 80 as indicated on the drawings.

   a. Use for protection of primary feeders within transformer vaults.
   b. Use for exterior branch circuits or feeders.
   c. Use underground or under slab feeders or branch circuits.

F. Surface Metal Raceway: Use as exposed raceway system in finished spaces with existing CM U or concrete construction or at locations indicated on the drawings.

1. Use surface metal raceway system of size required for number of wires to be installed therein. Use specific size when indicated on the drawings.

2. 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. Run raceway along top of baseboards, care being taken to avoid telephone and other signal wiring. 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.

Run raceway around door frames and other openings. Run raceway on ceiling or walls perpendicular to or parallel with walls and floors.

3. Secure raceway at intervals not exceeding 36 inches.

4. 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.

5. 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.

6. 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:

   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 to be mounted thereon, gage or thickness of metal as required by NFPA 70, including provision for mounting and knockouts for entrance of raceway.

G. Wireways: May be used indoors in dry locations for exposed raceway between grouped, wall mounted equipment.

3.04 FITTINGS AND ACCESSORIES SCHEDULE

A. General:

1. 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.

2. 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.

3. 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.

4. Use caps or plugs to seal ends of conduits until wiring is installed to exclude foreign material.

5. 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.

6. Use expansion fittings where raceways cross expansion joints (exposed, concealed, buried).

7. Use deflection fittings where raceways cross expansion joints that move in more than one plane.

8. Use 2 locknuts and an insulated bushing on end of each conduit entering sheet metal cabinet or box in dry or damp locations.

   a. Plastic bushing may be used on 3/4 inch conduit in lieu of insulated bushing.
   b. Terminate conduit ends within cabinet/box at the same level.

B. For Rigid Metal Conduit: Use threaded fittings and accessories. Use 3 piece conduit coupling where neither piece of conduit can be rotated.

C. For Electrical Metallic Tubing: Use compression type connectors and couplings.
D. For Flexible Metal Conduit: Use flexible metal conduit connectors.

E. For Liquid-tight Flexible Metal Conduit: Use liquid-tight connectors.

F. For Rigid Nonmetallic PVC Conduit:

1. Use conduit manufacturer's standard fittings and accessories.

2. Provide expansion fittings for exterior conduits as required by NFPA 70.

G. For Surface Metal Raceway: Use raceway manufacturer's standard fittings and accessories. Match raceway finish color.

H. 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 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 262300 – LOW VOLTAGE SWITCH

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install, where indicated, a free-standing, dead-front type low voltage distribution switchboard, utilizing group mounted circuit protective devices 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 low voltage distribution switchboards and all components shall be designed, manufactured and tested in accordance with the latest applicable following standards:

1. NEMA PB-2
2. UL Standard 891
3. UL standard 1066
4. UL standard 489
5. UL Standard 1449 4th edition

1.04 SUBMITTALS – FOR REVIEW / APPROVAL

A. The following information shall be submitted to the Engineer:

1. Master drawing index
2. Front view elevation
3. Top view
4. Single line
5. Schematic diagram
6. Nameplate schedule
7. Component list
8. Conduit entry/exit locations
9. Assembly ratings including:

    a. Short-circuit rating
    b. Voltage
    c. Continuous current

10. Major component ratings including:

    a. Voltage
    b. Continuous current
    c. Interrupting ratings

11. Cable terminal sizes
12. Product data sheets

B. Where applicable, the following additional information shall be submitted to the Engineer:

1. Busway connection
2. Connection details between close-coupled assemblies
3. Composite floor plan of close-coupled assemblies
4. Key interlock scheme drawing and sequence of operations.

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.
2. Wiring diagrams
3. Certified production test reports
4. Installation information
5. Seismic certification and equipment anchorage details as specified.

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.

D. Where noted in the contract documents provide seismic qualified equipment.

1.07 REGULATORY REQUIREMENTS

A. The low-voltage switchboard 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 MANUALS

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 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.

C. References to Eaton equipment herein are intended as “Eaton or approved equal.”

2.02 RATINGS

A. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current of 65,000 amperes symmetrical at rated voltage or as shown on the contract documents.

B. Bus voltage and current rating to be as indicated on the contract documents.

2.03 CONSTRUCTION

A. Switchboard shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides and rear shall be covered with removable bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide adequate ventilation within the enclosure.

B. All sections of the switchboard shall be front and rear aligned with depth as shown on the drawings. All protective devices shall be group mounted. Devices shall be front removable and load connections front accessible enabling switchboard to be mounted against a wall.

C. The assembly shall be provided with adequate lifting means.

D. The switchboard shall be equal to Eaton type Pow-R-Line C utilizing the components herein specified and as shown on the drawings.

E. The switchboard shall be suitable for use as service entrance equipment and be labeled in accordance with UL requirements.

2.04 BUS

A. All bus bars shall be silver-plated copper. Where aluminum bussing is specified in the drawings provide tin-plated aluminum. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria.

B. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.

C. A 1/4 x 2-inch copper ground bus (minimum) shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchboard.

D. All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with conical spring-type washers.

2.05 WIRING / TERMINATIONS

A. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

B. Mechanical-type terminals shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size as indicated on the drawings.

C. Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

D. All control wire shall be type SIS, bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle type terminals are provided integral to a device. All current transformer secondary leads shall first be connected to conveniently accessible short-circuit terminal blocks before connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. Provide wire markers at each end of all control wiring.

2.06 MAIN AND TIE PROTECTIVE DEVICES

A. Protective devices shall be fixed mounted insulated case low-voltage circuit breakers, Eaton type NRX or approved equal. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating.

B. Main and tie breakers shall be true two-step stored energy devices and shall be manually operated unless otherwise indicated on contract documents.

C. All main and tie circuit breakers shall have a minimum symmetrical interrupting capacity of 65,000 amperes. Main and tie circuit breakers shall have 30-cycle short-time withstand ratings equal to interrupting capacity up to 42kA.

D. All main and tie insulated case circuit breakers shall be UL489 listed.

E. All insulated case circuit breakers shall have a nameplate clearly marking any electrical accessories that are mounted in the breaker at the time of sale. The accessory shall have a label that will indicate its function and voltage. All accessories shall be modular, plug and lock type, and UL listed for easy field installation.

F. The breaker control interface shall have color-coded visual indicators to indicate contact open or closed positions as well as mechanism charged and discharged positions. Manual control pushbuttons on the breaker face shall be provided for opening and closing the breaker. The power circuit breaker shall have a "Positive On" feature. The breaker flag will read "Closed" if the contacts are welded and the breaker is attempted to be tripped or opened.

G. Each molded case circuit breaker shall be equipped with a true RMS sensing, solid-state tripping system consisting of at least three current sensors microprocessor-based trip device and trip actuator. The trip unit shall use microprocessor-based technology to provide the basic adjustable time-current protection.

H. Provide trip units with integral arc flash reduction mode for 1200 ampere frame and above. The use of zone selective interlocking to emulate this feature does not meet the intent of these specifications and will not be allowed.

I. Where noted on the contract documents provide zone selective interlocking between trip units.

J. System coordination shall be provided by adjusting rotary switches for the following microprocessor-based time-current curve shaping adjustments:

1. Adjustable long-delay pick-up setting with minimum of 10 settings
2. Adjustable long-delay time - 0.5 to 24 seconds
3. Adjustable short-delay pick-up setting – 1.5x to Max allowable by frame
4. Adjustable short-delay time 0.0 sec up to 0.5 sec depending on frame with selectable flat or I2t curve shaping
5. Adjustable instantaneous setting 2x to Max allowable by frame
6. Where indicated, adjustable ground fault current pickup (0.2 – 1.0 x In in 0.10x increments) and time (0.1 – 1.0 sec in 0.10sec increments), with selectable flat or I^2t curve shaping. Provide switch selectable options for GF OFF, GF alarm, or GF trip.

K. Where indicated provide 100% rated UL listed circuit breakers.

L. Trip units shall be capable of metering phase, neutral, and ground current with an accuracy of +/- 2.0% of the reading.

M. Trip units shall include embedded Modbus RTU communication capability. Breaker status and all monitored parameters shall be available.

N. Trip units shall collect and store pertinent information to the trip unit and circuit breaker health and event history. The trip unit shall also include diagnostic features to allow the user to investigate events and dynamically monitor the health of the trip unit and the breaker.

1. Number of operations (load and no-load)
2. Number of trips (overload trips, short circuit trips)
3. Run time.
4. Breaker ambient temperature.
5. Breaker remaining life - Then the trip unit shall utilize an algorithm that applies a weighted value to all of these inputs to determine the remaining life of the breaker. The remaining life of the breaker shall be displayed or communicated in calculated percentage of life remaining.
6. All breaker health information shall be available via hard wire connection to a PC and via communications.

a. trip unit shall perform a waveform capture on trip, alarm, or user-initiated events.

1) Any breaker trip event shall capture a 10-cycle waveform. The trip unit shall store the most recent trip event waveform.
2) Any alarm event or user-initiated waveforms shall capture a 1-cycle waveform.
3) Waveform events shall capture and store all phase, neutral and ground currents.

2.07 FEEDER PROTECTIVE DEVICES

A. All feeder protective devices shall be Eaton or approved equal molded case circuit breakers with inverse time tripping characteristics.

B. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.

C. Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the contract documents.

D. All molded case circuit breakers shall be equipped with a true RMS sensing, solid-state tripping system consisting of at least three current sensors microprocessor-based trip device and trip actuator. The trip unit shall use microprocessor-based technology to provide the basic adjustable time-current protection.

E. Provide trip units with integral arc flash reduction mode for 1200A frame and above. The use of zone selective interlocking to emulate this feature does not meet the intent of these specifications and will not be allowed.

F. System coordination shall be provided by adjusting rotary switches for the following microprocessor-based time-current curve shaping adjustments:

1. Adjustable long-delay pick-up setting with minimum of 10 settings
2. Adjustable long-delay time - 0.5 to 24 seconds
3. Adjustable short-delay pick-up setting – 1.5x to Max allowable by frame
4. Adjustable short-delay time 0.0 sec up to 0.5 sec depending on frame with selectable flat or I2t curve shaping.
5. Adjustable instantaneous setting 2x to Max allowable by frame
6. Where indicated, adjustable ground fault current pickup (0.2 – 1.0 x In in 0.10x increments) and time (0.1 – 1.0 sec in 0.10sec increments), with selectable flat or I^2t curve shaping. Provide switch selectable options for GF OFF, GF alarm, or GF trip.

G. Where indicated provide 100% rated UL listed circuit breakers.

H. Trip units shall be capable of metering phase, neutral, and ground current with an accuracy of +/- 2.0% of the reading.

I. Trip units shall include embedded Modbus RTU communication capability. Breaker status and all monitored parameters shall be available.

J. Trip units shall collect and store pertinent information to the trip unit and circuit breaker health and event history. The trip unit shall also include diagnostic features to allow the user to investigate events and dynamically monitor the health of the trip unit and the breaker.

1. Number of operations (load and no-load)
2. Number of trips (overload trips, short circuit trips)
3. Run time
4. Breaker ambient temperature.
5. Breaker remaining life - Then the trip unit shall utilize an algorithm that applies a weighted value to all these inputs to determine the remaining life of the breaker. The remaining life of the breaker shall be displayed or communicated in calculated percentage of life remaining.
6. All breaker health information shall be available via hard wire connection to a PC and via communications.

    a. trip unit shall perform a waveform capture on trip, alarm, or user-initiated events.

        1) Any breaker trip event shall capture a 10-cycle waveform. The trip unit shall store the most recent trip event waveform.
        2) Any alarm event or user-initiated waveforms shall capture a 1-cycle waveform.
        3) Waveform events shall capture and store all phase, neutral and ground currents.

2.08 ACCESSORIES

A. Provide shunt trips, bell alarms, self-powered heaters and auxiliary switches as shown on the contract drawings.

2.09 MISCELLANEOUS DEVICES

A. Key interlocks shall be provided as indicated on the drawings.

B. Control power transformers with primary and secondary protection shall be provided, as indicated on the drawings, or as required for proper operation of the equipment.

C. For outdoor (NEMA 3R) installations, each section of the switchboard shall be provided with a thermostatically controlled space heater. Power for the space heaters shall be obtained from a source as indicated on the drawings.

2.10 UTILITY METERING

A. Comply with utility requirements.

B. Where indicated on the drawings, furnish a barrier to separate the utility metering compartment complete with hinged sealable door. Bus work shall include provisions for mounting utility company current transformers and potential transformers, or potential taps as required by the utility company. Provide service entrance label and provide necessary applicable service entrance features per NEC and local code requirements.

2.11 SURGE PROTECTIVE DEVICE (SPD)

A. Where indicated on the drawings, provide surge protection device subject to the requirements herein.

B. SPD shall comply with ANSI/UL 1449 4th Edition or later listing by Underwriters Laboratories (UL).

C. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.

D. The SPD shall be of the same manufacturer as the switchboard.

E. The SPD shall be factory installed integral to the switchboard by the original equipment manufacturer.

F. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.

G. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in the immediate proximity to the SPD.

H. All monitoring and diagnostic features shall be visible from the front of the equipment.

I. Maintenance Free Design – 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.

J. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.

K. Electrical Noise Filter – Each Type 2 unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.

L. Type 2 units with filtering shall conform to UL 1283 5th Edition.

M. Type 1 units shall not contain filtering or have a UL 1283 5th Edition Listing.

N. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

O. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:

1. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
2. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.
3. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
4. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
5. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
6. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

P. 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 shall 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 (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n 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

2.12 CUSTOMER METERING

A. Where indicated on the drawings, provide a separate customer metering compartment with a front facing hinged door and a UL listed microprocessor-based multifunction power meter equal to Eaton PXM2280. Include current transformers wired to shorting-type terminal blocks for each meter. Provide fused potential taps as the potential source for metering as shown on the drawings.

B. The meter surge withstand shall conform to IEEE C37.90.1 and ANSI C62.41.

C. The meter shall accept a direct voltage input range of up to 576 Volts Line to Neutral, and a range of up to 721 Volts Line to Line.

D. The meter shall accept a current input of up to 10 amps continuous. Startup current for a 5A input shall be no greater than 0.005A.

E. Fault Current Withstand shall be 100 Amps for 10 seconds, 300 Amps for 3 seconds, and 500 Amps for 1 second.

F. The meter shall have an accuracy of +/- 0.1% or better for volts and amps, and 0.2% for power and energy functions. The meter shall meet the accuracy requirements of ANSI C12.20 (Class 0.2%).

G. The meter shall provide true RMS measurements of voltage, phase to neutral and phase to phase; current, per phase and neutral.

H. The meter shall provide sampling at 400+ samples per cycle on all channels measured readings simultaneously.

I. Meter shall provide per phase % THD and individual harmonic monitoring to the 40th order for current and for voltage L-N. Metered values shall include Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh and kVARh. Provide 1 KYZ pulse output, on board meter limit exceeded alarms. Embedded web server shall support a waveform view of real time harmonic distortion and allow recording waveforms up to 64 samples per cycle. Meter shall have 768MB onboard memory for data logging.

J. The meter shall provide user configured fixed window or sliding window demand.

K. Meter shall provide a simultaneous voltage and current waveform recorder with programmable sampling rate.

L. The meter shall allow up to 1500 events to be recorded.

M. The meter shall be able to be configured and viewed from the on-board web server without the need for external software.

N. The meter shall include a three-line, bright red, .56" LED display.

O. The meter must display a % of Load Bar on the front panel to provide an analog feel. The % Load Bar shall have not less than 10 segments.

P. The meter shall support Modbus RTU, Modbus ASCII, DNP 3.0, Ethernet TCP/IP, Modbus TCP, BACnet/IP, SNMP v1 & v3 (Network), SMTP (email), HTTP and HTTPS communication.

2.13 ENCLOSURES

A. NEMA 1 Enclosure

B. Outdoor NEMA 3R Enclosure

1. Outdoor enclosure shall be non-walk-in and meet applicable NEMA 3R UL requirements.
2. Enclosure shall have sloped roof downward toward rear.
3. The enclosure shall be provided with bolt-on rear covers for each section.
4. Doors shall have provisions for padlocking.
5. Ventilating openings shall be provided complete with replaceable fiber glass air filters.
6. Where indicated on contract documents provide thermostatically controlled space heaters for each structure to prevent the accumulation of moisture.
7. Power for space heaters, lights and receptacles shall be obtained from a source as indicated on the drawings.

2.14 NAMEPLATES

A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background. Characters shall be 3/16-inch high, minimum. Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.

B. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

2.15 FINISH

A. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchboard shall be ANSI 61 light gray.

PART 3 – EXECUTION

3.01 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.

   1. The switchboard shall be completely assembled, wired, adjusted, and tested at the factory. After assembly, the complete switchboard will be tested for operation under simulated service conditions to ensure the accuracy of the wiring and the functioning of all equipment. The main circuits shall be given a dielectric test of 2200 volts for one (1) minute between live parts and ground, and between opposite polarities. The wiring and control circuits shall be given a dielectric test of 1500 volts for one (1) minute between live parts and ground.

B. The manufacturer shall provide three (3) certified copies of factory test reports.

3.02 MANUFACTURER'S CERTIFICATION

A. A certified test report of all standard production tests shall be available to the Engineer upon request.

3.03 TRAINING

A. The Contractor shall provide a training session for up to five (5) owner's representatives for one (1) normal workdays at a job site location determined by the owner.

B. A manufacturer's qualified representative shall conduct the training session. The training program shall consist of instruction on operation of the assembly, circuit breakers, fused switches, and major components within the assembly.

3.04 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's instructions, contract drawings and National Electrical Code.

B. The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to Contractor supplied floor sills to be set level in concrete per manufacturer's recommendations. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

3.05 FIELD ADJUSTMENTS

A. The Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the approved short-circuit study, protective device evaluation study and protective device coordination study.

B. Necessary field settings of devices, adjustments and minor modifications to equipment to accomplish conformance with an approved short circuit and protective device coordination study shall be carried out by the Contractor at no additional cost to the owner.

3.06 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.

3.07 SUBMITTALS FOR CLOSEOUT

A. Submit as part of project Operation and Maintenance Manuals:

1. Approved submittals.
2. As-built drawings
3. Test Results
4. Manufacturer's Operation and Maintenance Documentation
5. Warrantees

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 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