SPECIFICATIONS FOR
PORT CHESTER – RYE UNION FREE SCHOOL DISTRICT

PORT CHESTER HIGH SCHOOL
ADDITIONS, ALTERATIONS AND ATHLETIC FIELD

FULLER AND D'ANGELO PROJECT #: 17295.03 SED PROJECT NO. 66-19-04-03-0-004-032

OWNER: **PORT CHESTER – RYE UNION FREE SCHOOL DISTRICT**
ADDRESS: 113 Bowman Avenue
CITY: Port Chester, NY 10573

FULLER D'ANGELO P.C.
ARCHITECTS PLANNERS

ARCHITECTS:
FULLER AND D'ANGELO, P.C.
Architects and Planners
45 Knollwood Road Suite 401
Elmsford, NY 10523

MEP:
BARILE GALLAGHER & ASSOCIATES
39 Marble Avenue
Pleasantville, NY 10570

CIVIL ENGINEER
HUDSON ENGINEERING & CONSULTING
45 Knollwood Road, Suite 201
Elmsford, NY 10523

STRUCTURAL ENGINEER:
RYAN BIGGS ENGINEERING
257 Ushers Road
Clifton Park, NY 12065

ASBESTOS:
WARREN & PANZER ENG.
565 Washington Avenue
Albany, NY 12206

The undersigned certifies that to the best of his knowledge, information and belief, the plans and specifications are in accordance with applicable requirements of the New York State Uniform Fire Prevention and Building Code, The State Energy Conservation and Construction Code Standards of the Department of Education.

Date: BIID 01/21/19

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DIVISION 26 – ELECTRICAL

LIST OF DRAWING SHEETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DRAWING INDEX

A. Drawings are listed on Drawing T-1 for all contracts.

B. Drawings are the property of the Fuller and D'Angelo, Architects and Planners, and shall not be used for any other purpose other than contemplated by the Drawings and Project Manual

PART 2 - PRODUCTS (NOR USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

BIDDING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DOCUMENT INCLUDES

A. Bid Documents and Contract Documents
   1. Definition
   2. Contract Documents Identification
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   6. Product/Assembly/System Substitutions

B. Site Assessment
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C. Qualifications
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D. Bid Submission
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E. Bid Enclosures/Requirements
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   2. Consent of Surety
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   6. Additional Bid Information
   7. Selection and Award of Alternates

F. Offer Acceptance/Rejection
   1. Duration of Offer
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1.3 RELATED DOCUMENTS

A. Document 01 1000 - Summary of Contracts.

B. Section 00 4100 - Bid Form - Contract #1 General Constuction.

C. Section 00 4110 - Bid Form - Contract #2 Plumbing.

D. Section 00 4120 - Bid Form - Contract #3 HVAC.

E. Section 00 4130 - Bid Form - Contract #4 Electrical.

F. Section 00 4401 - Qualifications of Bidders

G. Section 00 4460 - Certification of Compliance With the Iran Disinvestment Act **OR**:

H. Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act.

I. Section 00 4476 - Insurance Certification.

J. Section 00 5200 - Form of Agreement.

K. Section 00 6000 - Bonds and Certificates.

L. Section 00 7200 - General Conditions.

M. Section 00 7310 - Special Provisions.

N. Section 01 2100 - Allowances.

O. Section 01 2300 - Alternates .

P. Section 01 5000 - Temporary Facilities and Controls.

Q. Section 01 7000 - Execution.

1.4 BID SUBMISSION

A. Bids signed and under seal, executed, and dated will be received at the office of the Port Chester-Rye UFSD, 113 Bowman Avenue, Port Chester, New York 10753 before 11:00 AM local time on the 26th day of February, 2019.

B. Offers submitted after the above time shall be returned to the bidder unopened.

C. Offers will be opened publicly immediately after the time for receipt of bids.

1.5 INTENT

A. The intent of this Bid request is to obtain an offer to perform work to complete Additions, Alterations and Athletic Field located at the Port Chester High School and a Stipulated Sum contract, in accordance with the Contract Documents.

1.6 LUMP SUM BIDS

A. Bids will be received for five (5) separate Prime Contracts as follows:
   1. Contract #1 General Construction (including Asbestos/Lead Abatement).
   2. Contract #2 Plumbing (including sprinkler system).
   3. Contract #3 HVAC .
   4. Contract #4 Electrical.

1.7 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

A. Work of this proposed Contract comprises additions and renovations, including general construction, structural, mechanical, electrical, and athletic field Work.

1.8 CONTRACT TIME

A. Perform the Work within the time stated in Section 01 1000 - Summary of Contracts and 01 1010 - Milestone Schedule.

B. All work for this project shall not commence prior to the issuance of Letter of Award by the Owner. The items of work shall be scheduled and completed as stated in Section 01 1000 - Summary of Contracts. Failure to complete the work within scheduled time(s) shall subject the Contractor to being assessed liquidated damages incurred by the Owner, including but not limited to cost for, Construction Manager, Fuller and D'Angelo, P.C., Consultants, Owner's staff, overtime, and legal costs as required to complete the project. The attention of the bidders is specifically directed to the provisions of the General Conditions of the Contract that time is of the essence to the Contract and that on no account will the contactor be permitted to assert a claim for damages for delays.

C. The bidder, in submitting an offer, accepts the Contract Time period stated for performing the Work. The completion date in the Agreement shall be the Contract Time added to the commencement date.

1.9 BID DOCUMENTS AND CONTRACT DOCUMENTS

A. Definitions: All definitions set forth in the General Conditions of the Contract are applicable to these Instructions to Bidders.

B. Bid Documents: Contract Documents supplemented with Bid Form, Supplements To Bid Forms and Appendices, Bid securities, Certification of Compliance with Iran Divestment Act, Declaration of Bidders

Inability to Provide Certification of Compliance, Contractor's Qualification Statement, Insurance certification, and Issued Addenda.

C. Contract Documents: Defined in AIA 232.

D. Bid, Offer, or Bidding: Act of submitting an offer under seal.

E. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

1.10 CONTRACT DOCUMENTS IDENTIFICATION

A. The Contract Documents are identified as Project Number 17295.03, as prepared by Fuller and D'Angelo P.C. 45 Knollwood Road, Elmsford, NY 10523, and with contents as identified in the Project Manual.

1.11 AVAILABILITY

A. Complete digital sets of Contract Documents shall be obtained online (with a free user account) as a download for a non-refundable fee of Forty-Nine ($49.00) Dollars at the following website: www.revplans.com under 'public projects'. Optionally, in lieu of digital copies, hard copies may be obtained directly from REV upon a deposit of One Hundred ($100.00) Dollars for each complete set. Checks for deposits shall be made payable to the Port Chester-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 website. 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.

B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

1.12 EXAMINATION

A. Bid Documents may be viewed at the office of Fuller and D'Angelo P.C. 45 Knollwood Road, Elmsford, NY 10523.

B. Immediately notify Architect and Construction Manager upon finding discrepancies or omissions in the Bid Documents.

C. Should any conflict occur in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the more costly method of doing the work, unless he shall have asked for and obtained a decision in writing from the Architect before the submission of his bid, as to what shall govern.

1.13 INQUIRIES/ADDENDA

A. Direct questions to Architect and Construction Manager.

B. Addenda are written or graphic instruments issued prior to the Bid Date which modify or interpret the bidding documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed

C. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.

D. Verbal answers are not binding on any party.

E. Clarifications requested by bidders must be in writing not less than 5 days before date set for receipt of bids. The reply will be in the form of an Addendum, if required, a copy of which will be forwarded to known recipients .

F. Questions: Any and all questions about the interpretation or clarification of the Bid Documents, or about any other matter affecting the Work or pertaining to the bid must be directed in writing on the form in Section 00 2115 - RFI Form to the Architect and Construction Manager:

Fuller and D'Angelo, P.C.	School Construction Consultants
45 Knollwood Road	190 Motor Parkway, Suite 201
Elmsford, NY 10523	Hauppauge, NY 11788
Attention: Frank DiFato, RA	Attention: William Recce
Voice: 914-592-4444	Voice: 631.567.0200 x 103
E-mail: frankd@fullerdangelo.com	E-mail: wr@scc-cm.com

G. Answers: The Architect will issue addenda, if necessary, to answer such questions. Bidders shall rely on answers contained in such addenda and **shall not** rely upon any oral answers given by any employee or agent of the Owner, Architect, Architect's Consultants, and Construction Manager.

1.14 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

A. Where the Bid Documents stipulate a particular product bidders shall comply with the specifications, performance and quality of the specification item. The Architect will not review any substitutions during the bidding period. The bidder assumes all responsibility to meet the requirements and the Architect shall be final authority as to a product is equal to the specification.

B. Wherever in the Contract Documents an article, material, apparatus, product or process is identified by trade name or catalog reference, or by the name of the patentee, manufacturer or dealer, it is understood that it constitutes the standard requirement to meet the contract specifications.

C. Where two or more articles, materials, apparatus, products or processes are listed as acceptable by reference to trade name or otherwise, the choice of these will be optional to the bidder.

D. Where articles, materials, apparatus, products or processes are listed by reference to a named specified item as “or Equal”, these shall be considered as “substitutions” and shall be submitted in accordance to Section 01 2500 - Substitution Procedures.

E. Bidders may base their bid on a product they may consider equal to the specified product. These shall be considered as “substitutions” and shall be submitted in accordance to Section 01 2500 - Substitution Procedures.

F. The bidder is made aware that the Owner and Architect will make the final determination as to what constitutes an equal.

G. If the Owner or Architect shall reject the proposed equal as not being the equal of that specifically named in the contract, the successful Contractor shall immediately proceed to furnish the designated article, material, apparatus, product or process specified or an approved equal without additional cost or time delay to the Owner.

H. See Section 01 2500 - Substitution Procedures for additional requirements.

1.15 SITE EXAMINATION

A. Examine the project site before submitting a bid.

B. Site Inspection: Bidders may inspect the site at the time of the pre-bid conference, if one is scheduled, or at other times by advance agreement with the Construction Manager. Bidders who do not inspect the site shall be nevertheless responsible for such information as might have been obtained from a reasonable site inspection

C. The bidder is required to contact Construction Manager in order to arrange a date and time to visit the project site.

1.16 PREBID CONFERENCE

A. A Bidders Conference has been scheduled for 2:00 P.M. on the 4th day of February, 2019, Bidders shall meet at the Auditorium of the Port Chester High School

B. Attendance is non mandatory. Bidder are strongly advised to attend.

C. All bidders, subcontractors and suppliers are invited.

D. Representatives of Owner's Representaive, Architect, Architect's Consultants, and Construction Manager will be in attendance.

E. Summarized minutes of this meeting may be circulated to all known bidders. These minutes will not form part of the Contract Documents.

F. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

1.17 EVIDENCE OF QUALIFICATIONS

A. The Owner reserves the right to require additional information it deems appropriate concerning the history of the contractor's performance of each such contract.

B. Bidder shall submit with their bid proposal a properly executed Section 00 4401 Qualification of Bidders.

C. 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 titled "Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act". Refer to Section 00 4460 & 00 4470.

1.18 SUBCONTRACTORS/SUPPLIERS/OTHERS

A. Port Chester-Rye UFSD reserves the right to reject a proposed subcontractor for reasonable cause.

B. Refer to General Conditions for additional requirements.

1.19 SUBMISSION PROCEDURE

A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.

B. Submit one copy of the executed offer on the Bid Forms included in the project manual, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, address, telephone number, title of the project and Port Chester-Rye UFSD's name on the outside.

C. Improperly completed information, irregularities in security deposit, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.

D. To submit a bid for a bid package, the bidder should photo copy or remove the proposal form for that bid package from the Project Manual. Then the bidder should complete, sign and submit the form(s) as required herein. If a bidder is bidding on more than one bid package, there must be on fully completed and signed form for each package being bid. The bidder should not submit the entire Project Manual with the bid proposal.

E. All bid prices shall be filled in, both in words and figures. Signatures shall be in ink and in longhand. Proposals which are incomplete, conditional or obscure may be rejected as informal. Additional copies of the Proposal Form will be furnished by the Architect upon request.

1. In case of a discrepancy between the words and figures, the written word, not the figures, will govern.
2. Make no erasures, cross-outs, whiteouts, write-overs, obliteration's, or changes of any kind in the Bid Form phraseology, in the entry of unit prices, or anywhere on the Bid form. Fill in all blanks spaces legibly. An illegible entry may disqualify the bid in its entirety. If a mistake is made, use a new Bid Form. No post bid meetings will be afforded to any bidder to explain or clarify illegible or changed entries.

F. Bidder's shall not rely on oral statements made by any employee or agent of the Owner, Architect, Architect's consultants or Owner's Representative. Before submitting a proposal, bidders shall fully inform themselves as to all existing conditions and limitations and shall include in the Proposal a sum to cover the cost of all items included in the Contract

G. No oral or telephonic proposals or modifications of proposals will be considered.

1.20 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, blanks, or irregularities of any kind, may at the discretion of the Port Chester-Rye UFSD, be declared unacceptable.

B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Port Chester-Rye UFSD, be declared unacceptable.

C. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Port Chester-Rye UFSD, invalidate the bid.

D. Failure to provide all costs, including Base Bid, Allowances, Alternate and Total Base Bids will, at the discretion of Port Chester-Rye UFSD, invalidate the bid.

1.21 SECURITY DEPOSIT

A. Bids shall be accompanied by a security deposit as follows:
   1. Bid Bond of a sum no less than 10 percent of the Bid Amount on AIA A310 Bid Bond Form, including Alternates, will be required for all Proposals.
   2. Refer to Section 00 6000 - Bonds and Certificates for additional requirements.

B. Endorse the Bid Bond in the name of the Port Chester-Rye UFSD as obligee, signed and sealed by the principal (Contractor) and surety.

C. The security deposit will be returned after delivery to the Port Chester-Rye UFSD of the required Performance and Payment Bond(s) by the accepted bidder.

D. Include the cost of bid security in the Bid Amount.

E. After a bid has been accepted, all securities will be returned to the respective bidders .

F. If no contract is awarded, all security deposits will be returned.

1.22 CONSENT OF SURETY

A. Submit with the Bid: The attorney in fact who executes the required bonds on behalf of the surety to affix thereto an original certified and current copy of his power of attorney indicating the monetary limit of such power.

1.23 PERFORMANCE ASSURANCE

A. Accepted Bidder: Shall provide a Performance and Payment bond, as described in Section 00 6000 - Bonds and Certificates prior to the execution of the Contract, the bidder to furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder in such form and amount as the Owner may prescribe and with such sureties secured through the bidder's usual sources as may be agreeable to the parties.

B. Include the cost of Performance and Payment Bonds in the Bid Amount.

C. The bidder shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto an original certified and current copy of his power of attorney indicating the monetary limit of such power

1.24 INSURANCE

A. There are special insurance requirements on this project. Refer to Article 11 (AIA 232) of the General Conditions for a summary description of the required coverages. The Owner reserves the right to refuse the award of a Contract to any apparent low bidder who fails to provide the specified insurance certificates at the required time.
   1. The Owner, Architect, Consultants, and Construction Manager shall be listed as "Additionally Insured" on all applicable policies.

B. All insurance purchased by Contractor shall constitute primary insurance and primary coverage for all risks insured and that any other liability insurance that Owner, Architect, Consultants, and Construction

Manager may procure or maintain is secondary and that there shall be no contribution by such insurance until insurance provided by the Contractor is exhausted.

1.25 BID FORM REQUIREMENTS

A. Complete all requested information in the Bid Form and Appendices.

1.26 SALES AND USE TAXES

A. The Owner is a tax exempt entity, so there shall be no charge for sales or use taxes. The Owner will document this status as requested.

1.27 FEES FOR CHANGES IN THE WORK

A. Refer to the General Conditions Article 7.

1.28 BID FORM SIGNATURE

A. The Bid Form shall be signed by the bidder, as follows:
   1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
   3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
   4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

1.29 EQUIVALENCY CLAUSE

A. Where, in these specifications, certain kinds, types, brands, or manufacturers of material are named, they shall be regarded as the standard of quality. Where two or more are named the Contractor may select one of those items, subject to meeting the requirements of the specified product. If the contractor desires to use any kind, type, brand, or manufacture of material other than those named in the specification, he shall indicate in writing, and prior to award of the contract, what kind, type, brand, or manufacture is included in the base bid for the specified items. 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. Contractor shall refer to Section 01 6000 and utilized Substitution Request Form in Section 01 2500 Substitution Procedures.

1.30 NONDISCRIMINATION

A. All Contractors and Subcontractors of all tiers and all vendors shall comply with all pertinent provisions of the State, Local and Federal law against discrimination in employment practices. Refer to Section 01 3306 - Non-Discrimination Clauses.

1.31 PREVAILING WAGES

A. New York State law requires the payment of prevailing wages on the project, as listed in 01 3554 - Prevailing Wage Rates.

1.32 ADDITIONAL BID INFORMATION

A. Submit the following Supplements concurrent with bid submission:
   1. Section 00 6000 - Bonds and Certificates for Bid Bond, Performance and Payment Bond.
   2. Section 00 4401 - Qualifications of Bidders.
   3. Section 01 2100 - Allowances.

4. Section 00 4460 - Certification of Compliance With the Iran Disinvestment Act **or** Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act.
5. Section 00 4476 - Insurance Certification.

B. The bidder by making his bid represents that he has read and understands the bidding documents.

C. The bidder by making his bid represents that he has visited the site and familiarized himself with the local conditions under which the work is to be performed. Visits to the site shall be arranged through the Architect

1.33 SELECTION AND AWARD OF ALTERNATES

A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternatives as a difference in bid price by adding to or deducting from the base bid price.

B. Bids will be evaluated on the total of the base bid price and alternatives selected by the Owner.

1.34 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of 45 days after the bid closing date, except as otherwise provided in General Municipal Law §103 (11).

1.35 ACCEPTANCE OF OFFER

A. Port Chester-Rye UFSD reserves the right to accept or reject any or all offers.

B. The bidder acknowledges the right of the Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of the Owner, at its discretion to reject a bid if the bidder fails to furnish any required bid security, or to submit the information required by the bidding documents, including Section 00 4401 “Qualifications of Bidders”, or if the bid is incomplete or irregular.

1.36 POST-BID PROCEDURE

A. The bid proposal, alternates, allowances , the proposed subcontractors, the Contractor's Qualification Statement,, and Information received from owners of other projects will be considered to determine whether the contractor is the “lowest responsible bidder” in making the award. The Owner and Architect may make such investigation as the Owner deems necessary to determine the responsibility of any bidder or to determine the ability of any bidder to perform the Work. Such investigation shall begin with a review of Section 00 4401 - Qualifications of Bidders and shall include such additional information as shall be required herein.

B. When requested by the Owner, bidders shall furnish all information and data required by the Owner within the time and in the form and manner requested by the Owner. Upon notification from the Owner, the apparent low bidder shall furnish, within Two (2) working days after the bid opening, Two (2)copies of the following information in writing:

1. Evidence of the bidder's financial responsibility, including a certified financial statement prepared by a certified public accountant. The financial statement shall include, but not limited to the following:
    a. Current assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses):
    b. Net Fixed Assets:
    c. Other Assets:
    d. Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes):
    e. Other Liabilities (e.g., Capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).
    f. The names, addresses and phone numbers of the subcontractors and suppliers that the bidder proposes to use on the project.

g. A bar-chart showing the bidder's proposed plan and schedule to complete the bidder's work in accordance with Section 01 1000 Summary of Contracts(s) and Section 01 1010 Milestone Schedule.
h. The insurance certificates required by the Bid Documents.
i. Resumes for Contractor's proposed supervisory staff, including qualifications for specialized expertise or any certification(s) required to perform the Work.
j. Names of proposed major sub-contractors (more than 15% of the bid amount) and a listing of the related trade of work and value.
k. Any special coordination requirements with other trades.
l. Any special storage and staging requirements for construction materials.
m. Any other special requirements.
n. A proposed schedule of values for the bidder's work.
o. A proposed list of submittals and a proposed schedule for making them, all keyed to the bar-chart.
p. References and experience:
    a) List of all past contracts with K12 Public School Districts
    b) Provide three (3) references (Name, Title, and Phone Number) associated with three (3) different projects (public or private sector) of similar scope and size to the one identified in this contract. Additionally, include the names of two major suppliers used for each of these three (3) projects.

2. After receipt of the above information, the Owner will designate a time and place for the meeting between the Owner, Architect, and Construction Manager and the apparent low bidder. The apparent low bidder's principal, project manager and site superintendent will attend that meeting, at which time the parties will discuss the bidder's responsiveness, responsibility and qualifications.
3. The Owner reserves the right to disapprove the use of any proposed Subcontractor, and in such event, the bidder shall submit the name of another Subcontractor in like manner within the time specified by the Owner, as set forth in of the Agreement.
4. To the fullest extent allowed by law, the Owner reserves the right to reject any bid if the evidence required by the Owner is not submitted or fails to satisfy the Owner that the bidder is responsible, able and qualified to carry out the obligations of the Contract or to complete the Work as contemplated. The Owner will consider the information received in determining whether or not to accept a proposal.
5. Acceptance of a proposal will be a notice in writing signed by a duly authorized representative of the Owner.
6. Any bidder whose proposal is accepted will be required to sign the Owner/Contractor Agreement no later than ten (10) days after notification of Award of Bid or five (5) days following receipt of Contract, whichever is later.
7. In the event that the Owner should reject the proposal of the bidder, the Owner may elect to meet with the next lowest bidder and to consider the information as provided above. In the event that the proposal of the next lowest bidder is rejected, the Owner may elect to meet with the third lowest bidder and repeat the above process. At all times the Owner retains the right to reject all bids.

END OF SECTION

RFI FORM

CONTRACTOR'S REQUEST FOR INFORMATION NO. ____ F&D RFI NO:_____

NAME OF PROJECT: PORT CHESTER HIGH SCHOOL
ADDITIONS, ALTERATIONS AND RELATED WORK

NAME OF OWNER: PORT CHESTER - RYE UFSD

DATE: _____

A/E PROJECT NO:17295.03

ARCHITECT	**CONTRACTION MANAGER**
FULLER AND D'ANGELO, P.C.	**SCHOOL CONSTRUCTION CONSULTANTS, INC.**
45 KNOLLWOOD ROAD	**190 MOTOR PARKWAY, SUITE 201**
ELMSFORD, NEW YORK 10523	**HAUPPAUGE, NY 22788**
TEL: 914.592.4444 FAX: 914.592.1717	**TEL:631-567-0200 FAX: 631-567-6816**

FROM (CO. NAME):_____

CONTACT NAME: _____

TELEPHONE NUMBER: _____

SUBJECT: _____

DISCIPLINE/TRADE: _____

DWG./SPEC. REFERENCE: _____

QUESTION: _____

_____

_____

_____

___FIELD CONDITION_____

___ DRAWING/SPEC _____

___ DISCREPANCY_____

___ OWNER CHANGE_____

___ CLARIFICATION _____

___ CONTRACTOR'S SUGGESTION (IF APPLICABLE): _____

ANSWER

_____

_____

_____

_____

_____

ARCHITECT'S SIGNATURE: _____DATE:_____

Note: review and any responses to this request for information by the architect/engineer is strictly for design intent only and does not constitute acknowledgement or acceptance of any cost or schedule implications unless specifically presented by the contractor. By submission of this request for information, the contractor assumes all responsibility in the absence of an approved change order or work directive.

END OF SECTION

BID FORM - CONTRACT #1 GENERAL CONSTUCTION

THE PROJECT AND THE PARTIES

TO:

Port Chester-Rye UFSD

113 Bowman Avenue

Port Chester, New York 10753

FOR:

Additions, Alterations And Related Work at:

Port Chester High School

1 Tamarack Road:

Port Chester, New York 10753

Project Number: 17295.03

DATE: _____ (Bidder to enter date)

SUBMITTED BY: _____

Bidder's Full Name _____

Address_____

City, State, Zip_____

Contact Individual and Telephone No. _____

1.1 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Fuller and D'Angelo P.C. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #1 General Construction Work for the Sum of:

1. BASE BID FOR Port Chester High School
   a. The Base Bid of this Proposal for all work required by the Contract Documents for Contract # 1 General Construction is as follows:

      _____

      _____($_____) DOLLARS
2. CASH ALLOWANCES
   a. The Allowance CA-GC-1 is as follows:
      Fifty Thousand _____ ($50,000.00) DOLLARS
   b. The Allowance CA-GC-2 is as follows:
      Five Thousand _____ ($5,000.00) DOLLARS
3. CONTINGENCY ALLOWANCES
   a. The Total Contingency Allowances as indicated in Section 01 2100 - Allowances Allowances is as follows:

      _____ ($_____) DOLLARS

      Note: Attach Section 01 2100 - Allowances itemized contingency list to bid proposal.
   b. **TOTAL BASE BID**
      a) The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #1 General Construction and Related Work at the Port Chester High School is as follows:

_____
_____(_____) DOLLARS

(The Total Base Bid is sum of 1.1.A.1.a, 1.1.A.2.a, and 1.1.A.2.b)

B. The undersigned further understands and agrees that he is to furnish and provide all the necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Bid stated, modified by such additive- or deductive alternatives, if any as are accepted by the Owner.

C. We have included the required security Bid Bond as required by the Instruction to Bidders.

D. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.

E. All applicable federal taxes are included and New York taxes are included in the Bid Sum.

F. All Allowances described in Section 01 2100 - Allowances are included in the Bid Sum.

1.2 ALTERNATES

A. Alternate No. GC-1 Southwest Parking Area and Steps:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to to provide, furnish and install all labor, equipment and material to install work related to the parking installation of the western portion of the Southwest Parking Area, including enlarged associated concrete steps and related work in accordance with specifications and as shown on the contract drawings.

_____ ($_____) DOLLARS

B. Alternate No. Exterior Concrete Grandstand Seating and Refurbishment

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to to provide, furnish and install all labor, equipment and material required for the installation, removal and replacement of the existing grandstand benches, installation of new railings and the refurbishment of the existing concrete bleacher sub-structure, painting and related work in accordance with specifications and as shown on the contract drawings

_____ ($_____) DOLLARS

C. Alternate No. GC-3 North Parking Area:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to install work related to the parking installation and related items in accordance with the specifications and shown on the contract drawings

_____ ($_____) DOLLARS

D. Alternate No. -GC-4 Stairs I, J and K

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to to provide , furnish and install all labor, equipment and material required to install work related to rehabilitate to the stairwells in accordance with specifications and as shown on the contract drawings.

_____ ($_____) DOLLARS

E. Alternate No. GC-5 Visiting Team and Weight Room:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to to provide , furnish and install all labor, equipment and material required to install work related to construct new Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building, in accordance with specifications and as shown on the contract drawings. The new elevator and related vestibules are base bid. and as shown on the contract drawings. The new elevator and related vestibules are base bid.

_____ ($_____) DOLLARS

F. Alternate No. - GC-6 Existing Exercise/New Weight Room Skylights and Existing Stairwell:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to replace existing 3rd floor skylights with new skylights and related work in the exisiting exercise/new weight room and exisiting stairwell in accordance with specifications and as shown on the contract drawings

_____ ($_____) DOLLARS

G. Alternate No. GC-7 Urn Replacement:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to provide one (1) exterior pre-cast concrete Urn and related work on the new Northeast plaza area, in accordance with specifications and as shown on the contract drawings.

_____ ($_____) DOLLARS

H. Alternate No. GC-7A Urn Replacement:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to provide three (3) additional exterior pre-cast concrete Urns and related work on the East side of the building, in accordance with specifications and as shown on the contract drawings.

_____ ($_____) DOLLARS

I. Alternate No. GC-8 Interior Bleachers Seating:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required for the installation and replacement of new bleacher benches on the north side (Bank A) of the new Gymnasium, and related work in accordance with specifications and as shown on the contract drawings.

_____ ($_____) DOLLARS

1.3 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.

B. If this bid is accepted by Port Chester-Rye UFSD within the time period stated above, we will:

1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Port Chester-Rye UFSD by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.4 REJECTION OF BIDS

A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids.

1.5 CONTRACT TIME

A. If this Bid is accepted, we will:

1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in 01 1010 Milestone Schedule. Failure to complete each phase of work by dates indicated will result in liquidated damages as stated in the General Conditions.

1.6 CHANGES TO THE WORK

A. Refer to General Conditions.

1.7 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.
   3. Addendum # _____ Dated _____.
   4. Addendum # _____ Dated _____.
   5. Addendum # _____ Dated _____.
   6. Addendum # _____ Dated _____.
   7. Addendum # _____ Dated _____.
   8. Addendum # _____ Dated _____.

1.8 BID FORM SUPPLEMENTS

A. The following information is included with bid proposal and submission:
   1. Allowances: In accordance with Section 01 2100.

B. The following shall be are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Section 00 4401 - Qualification of Bidders .
   2. Section 00 4460 - Certification of Compliance with the Iran Disinvestment Act OR
   3. Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance.
   4. Section 00 4476 - Insurance Certification.
   5. Section 00 6000 - Project Forms.

1.9 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid or proposal:
   1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
      a. 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.
      b. 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.
      c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.10 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
   1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.
   2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
   3. That said bidder is not in arrears to the Port Chester-Rye UFSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Port Chester-Rye UFSD
   4. That no member of the Port Chester-Rye UFSD or any officer or employee of the Port Chester-Rye UFSD or person whose salary is payable in whole or in part from the said school district treasury, or the spouse of any foregoing is or shall be or become interested, directly or

indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.

5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.
6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.11 BID FORM SIGNATURE(S)

The Corporate Seal of

_____

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer, Title)

(Seal)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Subscribed and sworn before me this day of____ 20_____

Notary Public: _____

My Commission Expire: _____

END OF BID FORM

BID FORM - CONTRACT #2 PLUMBING

THE PROJECT AND THE PARTIES

TO:

Port Chester-Rye UFSD

113 Bowman Avenue

Port Chester, New York 10753

FOR:

Additions, Alterations And Related Workat:

Port Chester High School

1 Tamarack Road

Port Chester, New York 10753

Project Number: 17295.03

DATE: _____ (Bidder to enter date)

SUBMITTED BY: _____

Bidder's Full Name _____

Address_____

City, State, Zip_____

Contact Individual and Telephone No. _____

1.1 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Fuller and D'Angelo P.C. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #2 Plumbing Work at Port Chester High School for the Sum of:

1. BASE BID FOR Port Chester High School

   a. The Base Bid of this Proposal for all work required by the Contract Documents for Contract #2 Plumbing is as follows:

   _____
   _____($_____) DOLLARS

   b. CASH ALLOWANCES

      a) The total Cash Allowance is as follows:

      Five Thousand _____ ($5,000.00) DOLLARS

   c. CONTINGENCY ALLOWANCES

      a) The Total Contingency Allowances as indicated in Section 01 2100 - Allowances Allowances is as follows:

      _____ ($_____) DOLLARS

      Note: Attach Section 01 2100 - Allowances itemized contingency list to bid proposal.

   d. **TOTAL BASE BID**

      a) The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #2 Plumbing and Related Work at the Port Chester High School is as follows:

   _____
   _____(_____) DOLLARS

   (The Total Base Bid is sum of 1.1.A.1.a, 1.1.A.1.b, and 1.1.A.1.c)

B. The undersigned further understands and agrees that he is to furnish and provide all the necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Bid stated, modified by such additive- or deductive alternatives, if any as are accepted by the Owner.

C. We have included the required security Bid Bond as required by the Instruction to Bidders.

D. All applicable federal taxes are included and New York taxes are included in the Bid Sum.

1.2 ALTERNATES

A. The Alternates for this Proposal required by the Contract Documents are listed in Section 01 2300.

B. Alternate No. P-1 Visiting Team and Weight Room::

1. The Contractor for Contract #2 Plumbing work shall state the amount to be ADDED TO the Base Bid to provide , furnish and install all labor, equipment and material required to renovate Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building 2nd and 3rd floors, in accordance with specifications and as shown on the contract drawings. The elevator and related vestibules are base bid.

_____ ($_____), DOLLARS

1.3 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.

B. If this bid is accepted by Port Chester-Rye UFSD within the time period stated above, we will:

1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Port Chester-Rye UFSD by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.4 REJECTION OF BIDS

A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids

1.5 CONTRACT TIME

A. If this Bid is accepted, we will:

1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in 01 1010 Milestone Schedule. Failure to complete each phase of work by dates indicated will result in liquidated damages as stated in the General Conditions.

1.6 CHANGES TO THE WORK

A. Refer to General Conditions.

1.7 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

1. Addendum # _____ Dated _____.
2. Addendum # _____ Dated _____.
3. Addendum # _____ Dated _____.
4. Addendum # _____ Dated _____.
5. Addendum # _____ Dated _____.
6. Addendum # _____ Dated _____.

7. Addendum # _____ Dated _____.
8. Addendum # _____ Dated _____.

1.8 BID FORM SUPPLEMENTS

A. The following information is included with bid proposal and submission:

B. The following shall be are attached to this Bid Form and are considered an integral part of this Bid Form:
1. Section 00 4400 - Qualifications of Bidders.
2. Section 00 4401 - Qualification of Bidders .
3. Section 00 4460 - Certification of Compliance with the Iran Disinvestment Act OR
4. Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance.
5. Section 00 4476 - Insurance Certification.
6. Section 00 6000 - Project Forms.
7. Section 01 2100 - Allowances: Itemized contingency allowance list.

1.9 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid or proposal:
1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
a. 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.
b. 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.
c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.10 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.
2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
3. That said bidder is not in arrears to the Port Chester-Rye UFSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Port Chester-Rye UFSD
4. That no member of the Port Chester-Rye UFSD or any officer or employee of the Port Chester-Rye UFSD or person whose salary is payable in whole or in part from the said school district treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.

6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.11 BID FORM SIGNATURE(S)

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer, Title)

(Seal)

_____

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Subscribed and sworn before me this day of____ 20_____

Notary Public: _____

My Commission Expire: _____

END OF BID FORM

BID FORM - CONTRACT #3 HVAC

THE PROJECT AND THE PARTIES

TO:

Port Chester-Rye UFSD

113 Bowman Avenue

Port Chester, New York 10753

FOR:

Additions, Alterations And Related Work at:

Port Chester High School

1 Tamarack Road:

Port Chester, New York 10753

Project Number: 17295.03

DATE: _____ (Bidder to enter date)

SUBMITTED BY: _____

Bidder's Full Name _____

Address_____

City, State, Zip_____

Contact Individual and Telephone No. _____

1.1 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Fuller and D'Angelo P.C. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #3 HVAC Work at Port Chester High School for the Sum of:

1. BASE BID FOR Port Chester High School
   a. The Base Bid of this Proposal for all work required by the Contract Documents for Contract #3 HVAC is as follows:

      _____
      _____($_____) DOLLARS
2. CASH ALLOWANCES
   a. Cash Allowance HV-1: Include an allowance for use according to the Owner's instructions.
      Fifteen Thousand_____($15,000.00) DOLLARS
   b. TOTAL BASE BID
      a) The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #3 Heating, Ventilation and Air Conditioning and Related Work at the Port Chester High School is as follows:

      _____
      _____(_____) DOLLARS

      (The Total Base Bid is sum of 1.1.A.1.a and 1.1.A.2.a)

B. The undersigned further understands and agrees that he is to furnish and provide all the necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Bid stated, modified by such additive- or deductive alternatives, if any as are accepted by the Owner.

C. We have included the required security Bid Bond as required by the Instruction to Bidders.

D. All applicable federal taxes are included and New York taxes are included in the Bid Sum.

E. All Allowances described in Section 01 2100 - Allowances are included in the Bid Sum.

1.2 ALTERNATES

A. The Alternates for this Proposal required by the Contract Documents are listed in Section 01 2300.

B. Alternate No. H-1 Visiting Team and Weight Room:

1. The Contractor for Contract #3 HVAC work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to install work related to renovate Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building 2nd and 3rd floors in accordance with specifications and as shown on the contract. drawings. The elevator and related vestibules are base bid.

_____($_____) DOLLARS

1.3 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.

B. If this bid is accepted by Port Chester-Rye UFSD within the time period stated above, we will:

1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Port Chester-Rye UFSD by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.4 REJECTION OF BIDS

A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids

1.5 CONTRACT TIME

A. If this Bid is accepted, we will:

1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in 01 1010 Milestone Schedule. Failure to complete each phase of work by dates indicated will result in liquidated damages as stated in the General Conditions.

1.6 CHANGES TO THE WORK

A. Refer to General Conditions.

1.7 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

1. Addendum # _____ Dated _____.
2. Addendum # _____ Dated _____.
3. Addendum # _____ Dated _____.
4. Addendum # _____ Dated _____.
5. Addendum # _____ Dated _____.
6. Addendum # _____ Dated _____.
7. Addendum # _____ Dated _____.
8. Addendum # _____ Dated _____.

1.8 BID FORM SUPPLEMENTS

A. The following information is included with bid proposal and submission:

B. The following shall be are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Section 00 4401 - Qualification of Bidders .
   2. Section 00 4460 - Certification of Compliance with the Iran Disinvestment Act OR
   3. Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance.
   4. Section 00 4476 - Insurance Certification.
   5. Section 00 6000 - Project Forms.

1.9 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid or proposal:
   1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
      a. 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.
      b. 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.
      c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.10 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
   1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.
   2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
   3. That said bidder is not in arrears to the Port Chester-Rye UFSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Port Chester-Rye UFSD
   4. That no member of the Port Chester-Rye UFSD or any officer or employee of the Port Chester-Rye UFSD or person whose salary is payable in whole or in part from the said school district treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
   5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.
   6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.11 BID FORM SIGNATURE(S)

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer, Title)

(Seal)

_____

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Subscribed and sworn before me this day of____ 20_____

Notary Public: _____

My Commission Expire: _____

END OF BID FORM

BID FORM - CONTRACT #4 ELECTRICAL

THE PROJECT AND THE PARTIES

TO:

Port Chester-Rye UFSD

113 Bowman Avenue

Port Chester, New York 10753

FOR:

Additions, Alterations And Related Workat:

Port Chester High School

1 Tamarack Road:

Port Chester, New York 10753

Project Number: 17295.03

DATE: _____ (Bidder to enter date)

SUBMITTED BY: _____

Bidder's Full Name _____

Address_____

City, State, Zip_____

Contact Individual and Telephone No. _____

1.1 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Fuller and D'Angelo P.C. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #4 Electrical Work at Port Chester High School for the Sum of:

1. BASE BID FOR Port Chester High School

   a. The Base Bid of this Proposal for all work required by the Contract Documents for Contract #4 Electrical is as follows::

   _____
   _____($_____) DOLLARS

   b. CASH ALLOWANCES

      a) The total Cash Allowance is as follows:

      Fifteen Thousand _____ ($15,000.00) DOLLARS

   c. CONTINGENCY ALLOWANCES

      a) The Total Contingency Allowances as indicated in Section 01 2100 - Allowances Allowances is as follows:

      Eighty Five Thousand _____ ($85,000.00) DOLLARS

   TOTAL BASE BID

      a) The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #4 Electrical and Related Work at the Port Chester High School is as follows:

      _____
      _____($_____) DOLLARS

      (Sum of 1.1.A.1.a, 1.1.A.1.b, and 1.1.A.1.c)

B. The undersigned further understands and agrees that he is to furnish and provide all the necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature

required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Bid stated, modified by such additive- or deductive alternatives, if any as are accepted by the Owner.

C. We have included the required security Bid Bond as required by the Instruction to Bidders.

D. All applicable federal taxes are included and New York taxes are included in the Bid Sum.

E. All Allowances described in Section 01 2100 - Allowances are included in the Bid Sum.

1.2 ALTERNATES -

A. Alternate No. E-1 Lighting:

1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to provide , furnish and install all labor, equipment and material required for installation of pole lights and light bollards and related work at the Southwest parking area. in accordance with specifications and as shown on the contract drawings.

_____($_____) DOLLARS

B. Alternate No. E-2 Lighting

1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid for the installation of pole lights and light bollards and related work at the North parking area, in accordance with specifications and as shown on the contract drawings.

_____($_____) DOLLARS

C. Alternate E-3 Visiting Team and Weight Room:

1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to renovate Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building 2nd and 3rd floors, in accordance with specifications and as shown on the contract drawings. The elevator and related vestibules are base bid.

_____($_____) DOLLARS

D. Alternate E-4 Stairs I, J and K.

1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to provide lighting and electrically associated work in the connectiing stairs in accordance with specifications and as shown on the contract drawings.

_____($_____) DOLLARS

1.3 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.

B. If this bid is accepted by Port Chester-Rye UFSD within the time period stated above, we will:

1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Port Chester-Rye UFSD by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.4 REJECTION OF BIDS

A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids

1.5 CONTRACT TIME

A. If this Bid is accepted, we will:

1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in 01 1010 Milestone

Schedule. Failure to complete each phase of work by dates indicated will result in liquidated damages as stated in the General Conditions.

1.6 CHANGES TO THE WORK

A. Refer to General Conditions.

1.7 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.
   3. Addendum # _____ Dated _____.
   4. Addendum # _____ Dated _____.
   5. Addendum # _____ Dated _____.
   6. Addendum # _____ Dated _____.
   7. Addendum # _____ Dated _____.
   8. Addendum # _____ Dated _____.

1.8 BID FORM SUPPLEMENTS

A. The following information is included with bid proposal and submission:
   1. Alternates: In accordance with Section 01 2300.
   2. Allowances: In accordance with Section 01 2100.

B. The following shall be are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Section 00 4400 - Qualifications of Bidders.
   2. Section 00 4460 - Certification of Compliance with the Iran Disinvestment Act OR
   3. Section 00 4470 - Declaration of Bidder's Inability to Provide Certification of Compliance.
   4. Section 00 4476 - Insurance Certification.
   5. Section 00 6000 - Project Forms.

1.9 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid or proposal:
   1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
      a. 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.
      b. 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.
      c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.10 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
   1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.

2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
3. That said bidder is not in arrears to the Port Chester-Rye UFSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Port Chester-Rye UFSD
4. That no member of the Port Chester-Rye UFSD or any officer or employee of the Port Chester-Rye UFSD or person whose salary is payable in whole or in part from the said school district treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.
6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.11 BID FORM SIGNATURE(S)

The Corporate Seal of

_____

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer, Title)

(Seal)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Notary Public: _____ My Commission Expire: _____

Subscribed and sworn before me this day of____ 20____

END OF BID FORM

QUALIFICATION OF BIDDERS

1.1 REQUIREMENTS

A. The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

B. With the submittal of the Bid Proposal Form, **the bidder shall attach this Qualification of Bidders** and shall answer all the questions and provide all information requested herein. Failure to answer these questions or provide information requested in full may be cause for rejection of the bidder's proposal. If more space is needed, attach additional sheets with reference to subject paragraph.

C. The Owner reserves the right to consider, but not limited to, the financial responsibility, experience and reputation in the construction industry, as well as the specific qualifications listed below and elsewhere in this document in considering bids and awarding the contract. The Board of Education reserves the right to waive any informalities if, at its discretion the interest of the Port Chester-Rye UFSD will be better served.

D. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, license to perform work in the State.

E. Each Company (Bidder) shall have not less than five (5) years' experience in performing work substantially **similar in scope, size, complexity and dollar value** to the work of this project.

F. Each Company shall have been in existence under the same name for no less than five (5) years.

G. The contractor shall furnish a detailed statement of each project that it has performed during the most recent five (5) years including, but not limited to, the name and address of the project, the name of the awarding entity/owner, the name of the awarding entity's/owner's representative, and architect, current telephone numbers where each can be reached, the description of the project, general scope of the contractor's work, contract price, dates of performance, whether the contract was terminated for cause or convenience, whether the contract was completed and whether liquidated damages were assessed against the contractor, and if so, provide a written explanation.

1. The Owner reserves the right to require additional information it deems appropriate concerning the history of the contractor's performance of each such contract.

H. The final determination of whether the contractor possesses the requisite experience rests in the sole discretion of the Owner.

I. To be considered qualified, in addition to the items listed in the Contractor's Qualification Statement, bidder must demonstrate to the Owner's satisfaction:

1. The Corporation, partnership, sole proprietorship of the entity in whose name the bid is submitted has no less than the previous five (5) years performing or coordinating the Work which they are bidding on.
2. The bidder is capable of and intends and intends to perform the work with its own employees in accordance with Article 5.2.5 of the General Conditions.
3. The bidder will perform the work with sufficient personnel as required to comply with the schedule.
4. Each subcontractor must have a minimum of five (5) years experience in the work and/or applicable trade.
5. Field Superintendent must have at least five (5) years experience as a working field superintendent and must speak English or have a translator available at all times at no cost to the Owner.

1.2 QUESTIONAIRE:

Submitted to: Port Chester-Rye UFSD

Address: 113 Bowman Avenue

City/Town: Port Chester, New York 10753

Submitted By: _____

Corporation _____Partnership _____ Individual_____

Address:_____

Principal Office: _____

Other: _____

Name of Project: Additions, Alterations And Related Work
Port Chester High School

Type of Work: (file separate for each Classification of Work)
General Construction, Plumbing, HVAC, and Electrical and Related Work.

1.3 ORGANIZATION

A. How many years has your organization been in business as a Contractor? _____
   1. How many years has your organization been in business under its present business name? _____
   2. Under what other or former names has your organization operated?
      _____
      _____

B. What is the firm's bonding range?
   Single _____
   Aggregate _____

C. If your organization is a corporation, answer the following:
   1. Date of Incorporation: _____
      a. State of Incorporation: _____
      b. President's Name:_____
      c. Vice-president's name(s): _____
      d. Secretary's name: _____
      e. Treasurer's name: _____

D. If your organization is a partnership, answer the following:
   1. Date of organization:_____
      a. Type of partnership (if applicable):_____
      b. Name(s) of general partner(s):
         _____
         _____

E. If your organization is individually owned, answer the following:
   1. Date of organization:_____
   2. Name of owner: _____

F. If the form of your organization is other than those listed above, describe it and name the principals:
   _____
   _____

1.4 OWNERSHIP, MANAGEMENT, AFFILIATION

A. Identify each person who is or has been ,within the past five years, an owner of 5.0% or more of the firm's shares, one of the five largest shareholders, a director, an officer, a partner or the proprietor, or a managerial employee.

   First Name: _____MI___Last Name_____DOB_____

   % Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title _____Partner: Yes__ No____

First Name: _____MI____Last Name_____DOB_____

% Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title _____Partner: Yes__ No_____

First Name: _____MI____Last Name_____DOB_____

% Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title _____Partner: Yes__ No____

B. Joint Ventures: Provide information for all firms involved. Fill in name, % owned, office held; indicate by Y or N whether director, officer, partner and title

First Name: _____MI_____Last Name_____DOB_____

% Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title _____Partner: Yes__ No___

First Name: _____MI_____Last Name_____DOB_____

% Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title _____Partner: Yes__ No___

First Name: _____MI_____Last Name_____DOB_____

% Owned: __ Director: Yes__ No__ Officer: Yes__ No__ Title_____ Partner: Yes__ No____

C. Has the firm or any firm listed in response to questions above defaulted or been terminated and its surety called upon to complete, any contract awarded within the past five years Yes ___ No ___ If yes, give date(s), agency (ies)/owner(s), project(s), contract numbers, and describe including the result:

_____

_____

D. List below any projects performed by the bidder in the past five (5) years on which any of the following events occurred:

1. Were any extension of time were requested by the contractor, Yes__ No __and were such requests granted? Yes__ No __
2. Was litigation and/or arbitration commenced by either the Owner or the bidder as a result of the work of the project performed by the bidder? Yes __ No __
3. Were any liens filed on the project by subcontractors or material suppliers of the bidder? Yes__ No __
4. Did the bidder make any claims for extra work on the project, and did said claim result in a change order? Yes_ No ___
5. If Yes:

Project Name/Address_____

Type of Event_____

Name & Phone # of Owner: _____

Contact Person at Owner: _____

E. For all contracts within the past five years: (a) List all liens or claims over $25,000 filed against the firm and remaining undischarged or unsatisfied for more than 90 days; and (b) list and describe all liquidated damages assessed: _____

_____

1.5 FINANCIAL INFORMATION

A. Submit firm's most recent annual financial statement.

1.6 OTHER INFORMATION

A. Within the past five years has the firm, any affiliate, any predecessor company or entity or any person identified in questions number 1.1 through 1.2 above been the subject of any of the following: (Respond to each question and describe in detail the circumstances of each affirmative answer: (Attach additional pages if necessary).

1. A judgment of conviction for any business-related conduct constituting a crime under state or federal law No__ Yes__
2. A criminal investigation or indictment for any business-related conduct constituting a crime under state or federal law? No__ Yes__
3. A grant of immunity for any business-related conduct constituting a crime under state and federal law? No__ Yes__
4. A federal or state suspension or debarment? No__ Yes__
5. A rejection of any bid for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid? No__ Yes__
6. A denial or revocation of prequalification? No__ Yes__
7. A voluntary exclusion from bidding/contracting agreement? No__ Yes__
8. Any administrative proceeding or civil action seeking specific performance or restitution in connection with any public works contract except any disputed work proceeding? No__ Yes__
9. An OSHA Citation and Notification of Penalty containing a violation classified as serious? No__ Yes__
10. An OSHA Citation or Notification of Penalty containing a violation classified as willful? No__ Yes__
11. A prevailing wage or supplement payment violation? No__ Yes__
12. A State Labor Law violation deemed willful? No__ Yes__
13. Any other federal or state Citations, Notices, violation orders, pending administrative hearings or proceedings or determinations of a violation of any labor law or regulation? No__ Yes__
14. Any criminal investigation, felony indictment or conviction concerning formation of or any business association with, an allegedly false or fraudulent women's, minority or disadvantaged business enterprise? No__ Yes_
15. Any denial, desertification, revocation or forfeiture of Women's Business Enterprise, Minority Business Enterprise or Disadvantaged Business Enterprise status? No__ Yes_
16. Rejection of a low bid on a State contract for failure to meet statutory affirmative action M/WBE requirements? No__ Yes_
17. A consent order with the NYS Department of Environmental Conservation or a federal, state or local government enforcement determination involving a violation of federal or state environmental laws? No__ Yes_
18. Any bankruptcy proceeding? No__ Yes__
19. Any suspension or revocation of any business or professional license? No__ Yes_
20. Any citations, notices, violation orders, pending administrative hearings or proceedings or determinations for violation of hearings or proceedings or determinations for violation of:
    a. Federal, state or local health laws, rules or regulations? No__ Yes_
    b. Federal, state or local environmental laws, rules and regulations? No__ Yes_
    c. Unemployment insurance or workers compensation coverage or claim requirements. No__ Yes_
    d. ERISA (Employee Retirement Income Security Act) No__ Yes_
    e. Federal, state or local human rights laws. No__ Yes_
    f. Federal, state or local labor laws. No__ Yes__
    g. Federal or state security laws. No__ Yes_
    h. Withdrawal or an agreement to withdraw a bid submitted to a public owner or a request by a public owner to withdraw a bid? No__ Yes_

B. During the five year period preceding the submissions 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 of 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. No__ Yes_

C. During the five year period preceding the submission of this bid, has the bidder been the subject of 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. No__ Yes_

D. 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 Worker's 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 such instance of violation and the status of the claimed violation at the time of disposition of this bid. No__Yes __

E. 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 indicted the charge against the individual and the date of submission of the charge. No__Yes__

F. 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. No__ Yes_

G. Has the bidder ever defaulted or had its surety called upon to complete any contract awarded within the past five years. If the answer to this question is yes, list the projects, the dates and the nature of the termination (convenience, suspension, for cause). No__ Yes_

H. Has any officer or partner of the bidder's organization ever defaulted or had its surety called upon to complete any contract awarded within the past five years or been an officer or partner of some other organization that has been terminated from a project by an owner? If yes, state: No__ Yes__

I. Name of Individual(s) _____ Name of Organization(s) Reason(s)

_____

_____

1.7 LICENSING

A. List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration of license numbers, if applicable. _____

_____

B. List jurisdictions in which your organization's partnership or trade name is filed: _____

_____

C. Has any director, officer, owner or managerial employee had any professional license suspended or revoked? If the answer is yes, list the name of the individual, the professional license he/she formally had, whether the license was revoked or suspended and the date of the revocation or suspension. No__ Yes__

1.8 EXPERIENCE

A. List the categories of work that your organization will perform with its own forces: _____

_____

B. Claims and Suits. (If the answer of any of the questions below is yes, please attach details.)

1. Have you or has any director, officer, owner or managerial employee ever failed to complete any work awarded to them? If yes, list the project(s) the date(s) and the reason(s) for the failure to complete. No__ Yes__

2. Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers? No__ Yes__
3. Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years? No__ Yes__
4. Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.) No__ Yes_

C. On a separate sheet, list all similar construction projects your organization has in progress or completed, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

D. State total worth of work in progress and under contract: _____

E. On a separate sheet, list all projects, not listed above, that your organization has completed or in progress in the past five years, giving the name of the project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

F. State average annual amount of construction work performed during the past five years: _____
_____

G. On a separate sheet, list the construction experience and present commitment of the key individuals of your organization.

1.9 APPRENTICE PROGRAM

A. Has the Firm have in place apprenticeship agreements appropriate for the type and scope of work to be performed, that have been registered with, and approved by, the Commissioner of the New York State Department of Labor pursuant to the requirements found in Article 23 of the Labor Law. No__ Yes_

1.10 REFERENCES

A. Trade reference: _____

B. Bank references: _____

C. Surety: _____
1. Name of present bonding company: _____
2. Name and address of agent: _____
3. Name or previous bonding company: _____

1.11 CERTIFICATION

A. The undersigned recognizes that this questionnaire is submitted for the purpose of the Port Chester-Rye UFSD awarding a contract or approving a subcontract; acknowledges that the Owner may in its discretion, by means which it may choose, determine the truth and accuracy of all statements made herein; acknowledge that intentional submission of false or misleading information may constitute a felony under Penal Law §210.40 or a misdemeanor under Penal Law §210.35 or §210.45, and may also be punishable by a fine of up to $10,000 or imprisonment of up to five years under 18 U.S.C. §1001; and states that the information submitted in this questionnaire any attached pages is true, accurate and complete.

Dated at this day of _____

Name of Organization: _____

By: _____Title_____

being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading. Subscribed and sworn before me this day of:_____

Notary Public: _____My Commission Expire: _____

1.12 See Project Information Form attached.

Project Name: _____

Company work was performed under: _____

Who was Co. Principal in charge: _____

Location: _____

Cost of Contract: _____ **Final Cost of Work:** _____

Description of work: _____

_____

_____

Owners Name: _____

Owner Contact: Name _____ **phone**_____ **e.mail** _____

CM Name(if applicable): _____

CM Contact: Name _____ **phone**_____**e.mail**_____

Architect Firm: _____

Architect Contact: _____ **phone**_____ **e.mail**_____

END OF SECTION

CERTIFICATION OF COMPLIANCE WITH THE IRAN DISINVESTMENT 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 _____201___

Notary Public: _____

END OF SECTION

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

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 _____

201___

Notary Public: _____

INSURANCE CERTIFICATION

BID OR PROJECT NO. #17295.03

NAME OF PROJECT: Additions, Alterations And Related Work
Port Chester High School

Insurance Representative's Acknowledgement:

We have reviewed the insurance requirements set forth in the bid and are capable of providing such insurance to our insured in accordance with such requirements in the event the contract is awarded to our insured and provided our insured pays the appropriate premium.

INSURANCE REPRESENTATIVE: _____

ADDRESS: _____

Are you an agent for the companies providing the coverage?

Yes_____No_____

DATE:_____

_____

Insurance Representative (Name)

Bidder's Acknowledgement:

I acknowledge that I have received the insurance requirements of this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that a certificate of insurance must be submitted with my contract and if it is not, the Port Chester-Rye UFSD will reject my bid and award to the next lowest bidder.

FIRM NAME:

_____

ADDRESS: _____

DATE:_____

_____

Bidder's Signature

FORM OF AGREEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 FORM OF AGREEMENT

A. AIA Document A132, Owner-Contractor Agreement Form - Stipulated Sum - Construction Management Edition -2009, forms the basis of Contract between the Owner and Contractor. This form has been revised and all revisions have been included in the document, a draft copy is attached.

1.3 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions .

B. Section 00 7310 - Special Provisions.

C. Section 01 4216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT

AIA® Document A132™ – 2009

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

AGREEMENT made as of the 30th day of August in the year 2019

BETWEEN the Owner:

Port Chester – Rye Union Free School District
113 Bowman Avenue
Port Chester, NY 10573

and the Contractor:

for the following Project:

PORT CHESTER-RYE UFSD
ADDITIONS, ALTERATIONS
PORT CHESTER HIGH SCHOOL

The Construction Manager:

School Construction Consultants, Inc.
190 Motor Parkway
Suite 201
Hauppauge, NY 11788

The Architect:

Fuller and D'Angelo, P.C.
Architects and Planners
45 Knollwood Road
Suite 401
Elmsford, N.Y. 10523

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.

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

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 the Letter of Award 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.

« »

§ 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 **as indicated in Section 01100-Summary of Contracts for various phases, if any, of work and overall completion**
(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.)

« »

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.)

[X] 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:

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.2.4 Allowances included in the Stipulated Sum, if any:

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:

« »

§ 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:

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:

« »

§ 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:

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.)

« »

§ 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 (Refer to Section 01 2000 Price and Payment Procedures for Additional Requirements)

§ 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.

§ 5.1.1.1 Provide a separate application for each school building. Include the SED and Fuller and D'Angelo's project

§ 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 « last » 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 « last» day of the « following » 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 « » (« 45 ») 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 and approved by the Construct Manager and Architect, 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 Five percent (5%). 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 Five percent (5%); Insurance and Bill of Lading will be required to be submitted.

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

.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 ninety five percent (95%) of the Contract Sum, less such amounts as the Construction Manager recommends and the Architect determines for incomplete Work and unsettled claims; the **Contractor agrees that maximum payment shall be 95% of the total Contract Sum. The balance of Contract, (Final Payment) shall not be made until all Punch List Items are completed and Close-Out Documents are submitted.**

and

§ 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 « Five » percent (« 5 » %). 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 «Five» percent (« 5 » %) 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 and Section 01 2000 Price and Payment Procedures.

§ 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 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 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 **completed all Punch List Items and completed and submitted all Close-Out requirements** 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:

.4 Refer to Section 01 7800 Closeout Submittals for additional requirements.

« »

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.

[« X »] 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.

§ 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.)

« Zero » % « 0 »

§ 8.3 The Owner's representative:

Mr. Ray Renda
113 Bowman Avenue
Port Chester, NY 10573

§ 8.4 The Contractor's representative:

§ 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: **Dated June 25, 2018**

See attached Exhibit A

Section	Title	Date	Pages

§ 9.1.5 The Drawings: **Dated June 25, 2018**

See attached Exhibit B

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages
Addendum No. 1	7/13/18	4
Addendum No. 2	7/20/18	4
Addendum No. 3	7/27/18	4
Addendum No. 4	8/1/18	1
Addendum No. 5	8/2/18	1

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:

« »

.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)*

BONDS AND CERTIFICATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Attorney-in-fact who execute said bonds on behalf of a surety must affix thereto a certified and effectively dated copy of their Power of Appointment and Certification of an officer of the surety that the Power of Attorney continues in effect.

1.2 BID BOND:

A. A Bid Bond will be required for this project. The American Institute of Architects Document A310, February 2010 edition entitled "Bid Bond" shall be the contract bond form for this project. Each individual bid shall be accompanied by a check upon a duly authorized State, National Bank or Trust Company, duly certified in the sum equal to TEN (10%) percent of the total amount of the bid including alternates, or a Bid Bond in the amount of TEN (10%) of the bid, including alternates, payable to the Owner, and shall be enclosed in an envelope containing the bid; as a guarantee that the Bidder will, after the award is made to him, enter into a bona fide contract with the Owner for the work, and furnish the bonds and liability policies as required under the specifications. If, for any reason, whatsoever, the Bidder fails to enter into a proper contract and to execute the proper bonds, as required by these specifications, the amount of said guarantee be retained by the Owner shall be the difference between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work.

1. Each bid bond must also be accompanied by the written consent of the Surety Company authorized to do business in the State of New York and be Best "Secured" rated or better.

B. All certified checks, except the check of the Bidder to whom a contract is awarded, will be returned to the respective Bidders, as soon as the Letter of Award has been issued by the Owner.

1. The check of the Bidder, to whom a contract has been awarded, shall be retained until the contract has been executed and all bonds together with an approved liability insurance policy are filed with the Owner.

1.3 PERFORMANCE AND PAYMENT BOND:

A. A Performance and Labor and Material Payment Bond will be required for this project. The bond premiums will be paid for by the Contractor.

B. The American Institute of Architects, AIA Document A312, 2010 edition, entitled “Performance Bond" and AIA Document A312, 2010 edition, entitled "Payment Bond" and shall be the contract bond form for this project. AIA Document A311 is not acceptable.

C. Each bond shall be a sum equal to One Hundred (100%) of the Contract Sum and shall be in a form satisfactory to the Owner, and shall be underwritten by a surety company authorized to do business in the State of New York.

D. Every Bond under this paragraph must display the Surety's Bond Number.

E. Each bond must be accompanied by an original Power of Attorney, giving the name of attorney's in fact and extent of bonding capacity.

F. The Surety Company shall be obligated for the bonds for a two year period after substantial completion.

G. All Surety Companies shall be permitted to do business in the State of New York and be A.M. Best Rating of "A" or better as to Policy Holder Ratings and "VII" or better as to Financial Size category.

H. A rider including the following provisions 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 a forbearance on the part of

either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder ad notice to the Surety of such matters is hereby waived.

2. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner and the Owner shall have thirty (30) days from the time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first-class postage prepaid to Owner.
3. Surety agrees that it is obligated under the bonds to any successor, grantee or assignee of the Owner.

END OF SECTION

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Port Chester-Rye UFSD
113 Bowman Ave
Port Chester NY 10573

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
PORT CHESTER-RYE UFSD
ADDITIONS, ALTERATIONS
PORT CHESTER HIGH SCHOOL

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, 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.

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.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

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)
Port Chester-Rye UFSD
113 Bowman Ave
Port Chester NY 10573

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
PORT CHESTER-RYE UFSD
ADDITIONS, ALTERATIONS
PORT CHESTER HIGH SCHOOL

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

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.
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§ 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 When the Claimant has satisfied the conditions of Paragraph 4, and has submitted all supporting documentation and any proof of claim requested by the Surety, the Surety shall, with reasonable promptness, notify the Claimant of the amounts that are undisputed and the basis for challenging any amounts that are disputed, including, but not limited to, the lack of substantiating documentation to support the claim as to entitlement or amount, and the Surety shall, with reasonable promptness, pay or make arrangements for payment of any undisputed amount; provided, however, that the failure of the Surety to timely discharge its obligations under this paragraph or to dispute or identify any specific defense to all or any part of a claim shall not be deemed to be an admission of liability by the Surety as to such claim or otherwise constitute a waiver of the Contractor's or Surety's defenses to, or right to dispute, such claim. Rather, the

Claimant shall have the immediate right, without further notice, to bring suit against the Surety to enforce any remedy available to it under this Bond

§ 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.

§ 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:

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 a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder ad notice to the Surety of such matters is hereby waived.
2. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner and the Owner shall have thirty (30) days from the time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first-class postage prepaid to Owner.
3. Surety agrees that it is obligated under the bonds to any successor, grantee or assignee of the Owner

(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:	

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
PORT CHESTER-RYE UFSD
ADDITIONS, ALTERATIONS
PORT CHESTER HIGH SCHOOL

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.

§ 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.

§ 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.

§ 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:

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 a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder ad notice to the Surety of such matters is hereby waived.
2. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner and the Owner shall have thirty (30) days from the time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first-class postage prepaid to Owner.
3. Surety agrees that it is obligated under the bonds to any successor, grantee or assignee of the Owner

(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:	

GENERAL CONDITIONS

1.1 RELATED DOCUMENTS

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

1.2 FORM OF GENERAL CONDITIONS

A. AIA Document A232 - General Conditions of the Contract for Construction - Construction Management Edition, 2009, attached, is the General Conditions between the Owner and Contractor has been revised and all deletions and additions have been incorporated, and is hereby made a part of the specifications. All references to the General Conditions within these specifications shall mean "General Conditions of the Contract for Construction" the American Institute of Architects, A.I.A., Document A232, 2009 Edition, as revised.

1.3 RELATED REQUIREMENTS

A. Section 00 5200 - Form of Agreement.

B. Section 00 7300 - Supplementary Conditions.

C. Section 01 4216 - Definitions.

END OF DOCUMENT

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)

PORT CHESTER-RYE UFSD
ADDITIONS, ALTERATIONS
PORT CHESTER HIGH SCHOOL

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

School Construction Consultants, Inc.
190 Motor Parkway
Suite 201
Hauppauge, NY 11788

THE OWNER:
(Name, legal status and address)

Port Chester –Rye Union Free School District
113 Bowman Avenue
Port Chester, NY 10573

THE ARCHITECT:
(Name, legal status and address)

Fuller and D'Angelo, P.C.
Architects and Planners
45 Knollwood Road
Suite 401
Elmsford, N.Y. 10523

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.

TABLE OF ARTICLES

INDEX

(Topics and numbers in bold are section headings.)

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, 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, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals,

§ 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.

§ 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.

§ 1.2.4 In the event of conflict, ambiguity and/or unclear circumstances between any of the requirements of the Contract Documents, the requirement that is most inclusive of the highest quality and/or of the highest cost shall govern. The Contractor herewith agrees that no extra compensation shall be awarded to him, since he herewith received specific instructions to the procedure and values of the work.

§ 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.

(Paragraph deleted)

§ 2.2 Information and Services Required of the Owner

§ 2.2.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for building permit necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities..

§ 2.2.2 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 exercise proper precautions relating to the safe performance of the Work.

(Paragraph deleted)

§ 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.

§ 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 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, including architect's, engineer's and attorney's fees, 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, unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect and the Construction Manager.

§ 3.2.5 Except as to any reported errors, inconsistencies or omissions, and to concealed or unknown conditions defined in Paragraph 3.2.4, by executing the Agreement, the Contractor represents the following:

§ 3.2.5.1 The Contract Documents are sufficiently complete and detailed for the Contractor to (1) perform the work required to produce the results intended by the Contract Documents and (2) comply with all the requirements of the Contract Documents, within the time permitted for the completion of the work..

§ 3.2.5.2 The Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedures and techniques necessary to perform the work, use of materials, selection of equipment and requirements of product manufacturers will be consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to Work; (3) requirements of any warranties applicable to the work; and (4) all laws, ordinances, regulations, rules and orders which bear upon the Contractor's performance of the work.

§ 3.2.6 Building-In: All contractors and sub-contractors shall note the parts and materials which must be built in as the work progresses, including but not limited to all templates, forms, sleeves, inserts, parts, blocks, anchors, etc. for all work throughout and shall furnish to or set for the Contractor for General Construction in time to prevent delay in the work. Contractors shall also comply with Section 01 7310 or Section 01 7000 Cutting and Patching.

§ 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..

§ 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, including Subcontractors of a Subcontractor.

§ 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. Contractor is solely responsible for managing labor and labor relations, including labor disputes or concerted activity, direct or indirect, without any delays or interference with the work schedule and/or other contractor's at the site. No delay in the performance of the Work shall be excused by reason of labor problems affecting the Contractor or any subcontractor. In the event of strikes or labor disputes by other separate prime contractors, or other contractors performing work for the Owner under other Contracts, each contractor shall continue with its work and provide all necessary manpower as required to maintain the schedule and completion dates of the project.

§ 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. Contractor is solely responsible for managing labor and labor relations, including labor disputes or concerted activity, direct or indirect, without any delays or interference with the work schedule and/or other contractor's at the site. No delay in the performance of the Work shall be excused by reason of labor problems affecting the Contractor or any subcontractor. In the event of strikes or labor disputes by other separate prime contractors, or other contractors performing work for the Owner under other Contracts, each contractor shall continue with its work and provide all necessary manpower as required to maintain the schedule and completion dates of the project.

§ 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. . Should any disorderly, incompetent, or objectionable person be hired or employed by a Contractor, upon or about the premises of the Owner, for any purpose or in any capacity, he shall upon the request of the Construction Manager or Architect, be discharged from the work, and not again be employed thereon without the written permission of the Construction Manager or Architect.

§ 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. In the event of a conflict between provisions of the contract documents, provisions providing for the longest warranty period shall apply

(Paragraphs deleted)

§ 3.5.2 The warranties set forth herein shall survive termination of this Contract.

§3.5.2.1 The Contractor agrees to assign to the Owner at the time of final completion of the Work, any and all manufacturer's warranties relating to materials and labor used in the work and further agrees to perform the work in such a manner so as to preserve any and all such manufacturer's warranties.

§3.5.2.2 All new installations, assemblies, systems, equipment, and labor and materials installed by this Contractor shall be guaranteed against all defects and failures for a minimum period of 2 years from the date of final completion.

§3.5.2.3 For the above stated time periods from the date of final completion, the Contractor shall, at his own expense,

promptly repair and put into first class condition any workmanship and materials in which defects may develop, and shall, at his own expense, promptly replace all defective equipment, apparatus, fixtures and materials, to the full satisfaction of the Owner.

§3.5.2.4 The date of final completion of all work shall be stated in writing by the Architect/Engineer and as acknowledged in writing by the Contractor.

§3.5.2.5 During the guarantee period, the Contractor shall be responsible for all costs, incurred in making the defective work good, both for labor and materials, and for all resulting injuries and damages to the building and to equipment.

§3.5.2.6 The guarantee provided by the Contractor is in addition to any warranty provided by equipment and material manufacturer. The Contractor's guarantee period shall not negate the longer guarantee period provided by equipment and material manufacturers.

§3.5.2.7 The Contractor warrants good title to all materials, supplies and equipment installed or incorporated in the work.

§3.5.2.8 The Contractor for itself and its successors and assigns, warranties to the Owner and their successors and assigns:

a. The Warranty shall remain in effect for a period of time specified by appropriate Divisions of Specifications.

b. The Contractor will make good at its own cost and expense all defects and all damage caused to the Owner, in all Work and all trades required by the Contract Documents for Warranty Work. All corrections to defective Work shall be made at the convenience of the Owner

§ 3.6.1 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.

§ 3.6.2 Each Contractor shall pay all applicable local, state, federal and other taxes and licenses

Add the following for public projects

§ 3.6.3 This project will be considered tax exempt and contractors shall not include sales tax in their proposal. Owner shall provide required exempt documentation

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

§ 3.7.1 Unless otherwise provided in Paragraph 2.2.1 the Contract Documents, the Contractor shall secure and pay for all 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. The Contractor shall procure and obtain all bonds required of the Owner or by the municipality in which the project is located or by any other public or private body with jurisdiction over the Project. In connection with such bonds, the Contractor shall prepare all applications, supply all necessary back-up material and furnish the surety with any required personal undertakings. The Contractor shall also obtain and pay all charges for all approvals for street closings, parking meter removal and other similar matters as may be necessary or appropriate from time to time for the 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 7 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time

required for, performance of any part of the Work, will recommend 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. The superintendent shall be at the site at all times when work is being performed and be fluent in English.

§ 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 including addresses and telephone numbers of the members of his organization who can be contacted in the event of an off-hours emergency at the building site. 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 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. Revisions to schedule shall be approved by the Owner. Comply with 3.10.3.

§ 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 accordance with the most recent schedules submitted to the Owner, Construction Manager and Architect and incorporated into the approved Project schedule.

§ 3.10.5 All of the dates provided for in any of the schedules prepared by the Contractor and submitted to the Construction Manager and Architect, including all milestone and submittal dates, shall be considered to be "time of the essence" and may not be changed or modified without the Construction Manager and Architect's specific written approval.

§ 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. All shop drawings are the product and property of the Contractor.

§ 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.

§ 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.

§ 3.12.11 Comply with "Submittal Procedures." If this Section conflicts with Section 01 3000, Section 01 3000 shall control.

§ 3.13 Use of Site

§ 3.13.1 Each Contractor shall have limited access to the site on the inside and outside of the building. Comply with other sections regarding limited access. 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. Refer to **Section 01 7310 and Section 17 000** for additional requirements.

§ 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.

§ 3.15.3 Prior to occupancy the Owner must perform custodial cleaning of the work area. If the Contractor has not remove construction debris, equipment, tool etc which will prevent the Owner to perform custodial cleaning the Contractor will be back charged for additional cleaning costs incurred by the Owner.

§ 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 Indemnity Agreement - Compliance with the foregoing requirements as to insurance shall not relieve the contractor from liability under the indemnity agreement set forth in the general conditions as amended:

§3.18.1.1 To the fullest extent permitted by law, contractor shall defend, indemnify, and hold harmless the Owner, Construction Manager the Owner's Representative, the 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 and disbursements, arising out of or resulting from performance of the work, including, but not limited to, such claims, damages, losses and expenses attributable to bodily injury, sickness, disease, or death, or to injury or to destruction of tangible property (other than the work itself) including loss of use resulting there from, but only to the extent caused in whole or in part by 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 the general conditions or supplementary general conditions.

§3.18.1.2 In the event that any party is requested but refuses to honor the indemnity obligations hereunder, then the

party indemnifying shall in addition to other obligations, pay the cost to the party requesting indemnification or seeking enforcement and enforcing this indemnity requirement including, but not limited to attorney's fees.

§3.18.1.3 In addition, to the extent not covered above, the contractor or subcontractor shall defend, indemnify and hold harmless the owner, the owner's representative, and the architect, the architect's consultants, and agents and employees of any of them, from any and all claims, losses, damages, suits, obligations, fines, penalties, costs, charges and expenses, which may be imposed or incurred by or asserted against any of them by reason of any act or omission of such contractor, or any subcontractor, or any person or firm directly or indirectly employed by such contractor with respect to violations of OSHA requirements, rules and/or regulations

§ 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 has retained 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.

§ 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 and to perform such inspections and observations as are necessary to allow the Architect to review and approve change orders, claims of any kind and interim and general requisitions for payment, all in accordance with the applicable provisions of 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.The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1. . . 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 (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, 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.

§ 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 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 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 Sub-contractual 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.

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.

§ 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 All additions and deductions to the Contract Price not covered by unit prices resulting from changes in the Work shall be determined by the following outline:

CONTRACT WORK

1. Materials (Itemized Breakdown) _____
2. Rent of Equipment (Listed separately) _____
   Sub-Total #1(items 1 & 2) _____

3. Sales Taxes (where applicable on Sub-Total #l) _____

4. Labor (Itemized Breakdown) _____
5. Insurance (Workmen's Compensation
   Social security or as otherwise
   required and/or specified) _____
   Sub-Total #2 (items 3, 4 & 5) _____
6. Overhead & Profit (% x Sub-Total #2) _____
   As per Article 7.3.
7. Sub-contract Work (If applicable, in
   identical breakdown, as shown above) **Sub-Total #3** _____
8. Contractor's overhead & profit
   on sub-contract changes (5%) _____

Sub-Total #4 (items 6 & 8) _____

TOTAL QUOTATION (Sub totals 1, 2, 3 4) _____

Change Orders shall be submitted in total amounts for a particular change, not in installments for each trade thereafter. All partial change order submissions will be rejected and returned to the Contractor for completion.

Overhead and profit combined, included in the total cost to the Owner, shall be based on the following schedule:

For the Contractor, for any Work performed by the Contractor's own forces, ten percent (10%) of the cost.

For the Contractor, for Work performed by Contractor's sub-contractor, five percent (5%) of the amount due the sub-contractor.

For each sub-contractor or sub-contractor involved, ten percent (10%) of the cost

Cost to which overhead and profit is to be applied shall be limited to the following:

Labor.

Cost of Materials, including sales tax and cost of delivery.

Workers' or Workmen's Compensation Insurance.

Rental value of equipment and machinery.

§ 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:

.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.

§ 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.

§ 8.3.4 DAMAGES

§ 8.4.Contractor realizes that time is of the essence on this Contract and the date of Substantial Completion shall be no later than the date set forth in Article 3.2 of the Contract. The Contractor understands that substantial disruption of the school district's educational process will occur if the project is not completed by the date of substantial completion. In the event the Contractor fails to substantially complete the work under this contract by said scheduled date(s), the Contractor will be assessed Liquidated Damages the sum per calendar day, as follows:

Contract #1 GC General Construction	$1000.00
Contract #2 MC HVAC	$700.00
Contract #3 Plumbing	$700.00
Contract #4 Electrical	$700.00
Contract #5 Site Construction	$1,000.00.
Contract #6 Furnishings, Shelving & Equipment	$500.00

And additional costs incurred by the Owner, including but not limited to, Owner's Representative, Fuller and D'Angelo, P.C., Consultants, Owner's staff, overtime, and legal costs as required to complete the project.

and will, at the sole discretion of the Owner, be subtracted from the payment due the Contractor (or, if the amount due the Contractor as Payment is insufficient, any deficiency shall be paid by the Contractor to the Owner), except in cases where a delay is due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Government, in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, freight embargoes, or delays of Subcontractors or Suppliers due to such causes. Delay in acquisition of materials other than by reason of or freight embargoes will not constitute a delay excusable under this provision unless approved by the Owner in writing.
Subcontractors or Suppliers due to such causes. Delay in acquisition of materials other than by reason of or freight embargoes will not constitute a delay excusable under this provision unless approved by the Owner in writing.

§8.4.2 Within five calendar days from the occurrence of any such delay, the Contractor shall notify the Owner, in writing, of the cause of delay. The Owner will ascertain the facts and extent of the delay, and extend the time for completing the Work when, in his judgment, the findings of fact justify such an extension. Owners findings of fact will be final.

§8.4.3 In addition to Liquidated Damages, the Contractor shall be liable for all additional costs incurred by the Owner due to the failure of the Contractor to complete each Phase as required. The additional costs shall include but not be limited to the following:
§8.4.3.1 Staff, as required, to make the facility accessible to the contractor; For the Architect and Consultants to perform inspections after the completion date of each phase. Expenses and costs incurred by the Owner for additional services of the Owner's Representative, in addition to additional inspections.
§8.4.4 The cost of additional inspections by the Architect and their consultants will be at the rate of $160.00 per hour

per consultant.

§8.4.5 The said sum per calendar day and additional costs set out above, shall constitute the Liquidated Damages incurred by the Owner for each day of delay beyond the agreed upon dates of substantial completion. Such Liquidated Damages shall be in addition to any other damages (other than reason of delay) Owner may incur as a result of Contractor's breach of Contract, to include those which may be incurred pursuant to of the General Conditions.

§8.4.6 In addition to the liquidated damages described above, in the event the Contractor fails to complete all work under this Contract by said Scheduled Dates, the Contractor will, at the sole discretion of the Owner, not be permitted to perform any work during normal hours. Such work shall only be performed after hours, Saturdays, Sundays, holidays or periods when the school is unoccupied, at no additional cost to the Owner. This paragraph in no way limits any other rights, or remedies of the Owner under this Contract.

§8.4.7 All costs will be subtracted from payment due the Contractor (or, if the amount due the Contractor for payment is insufficient, any deficiency shall be paid by the Contractor to the Owner).

§8.4.8 This section shall in no way prevent the Owner from enforcing any other remedies it may be entitled to pursuant to the Contract, including the right of termination, and in the cases of termination, any damages suffered by the Owner shall not be considered damages by reason of delay, regardless of the reason for termination.

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 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, 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 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.

§ 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.

§ 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 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.

§ 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

(Paragraphs deleted)

All insurance purchased by Contractor shall constitute primary insurance and primary coverage for all risks insured and that any other liability insurance that Construction Manager and Fuller and D'Angelo, P.C. may procure or maintain is secondary and that there shall be no contribution by such insurance until insurance provided by the Contractor is exhausted.

(Paragraphs deleted)

§ 11.1.1.2 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.

§11.1.1.3 Certificates **of Insurance**. Each certificate shall include the following clause:

- .1 It is agreed that prior to any cancellation of, or material change in the policies certified to on this Certificate, 30 days written notice, by certified mail, return receipt requested, shall be sent to the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. Architects & Planners, prior to the effective date of such change or cancellation."
- .2 Shall specifically describe the work to be performed and the job site location.
- .3 **Shall include** to the fullest extent permitted by law, the Contractor shall, defend, indemnify and hold harmless the Owner, Architect, Construction Manager, their Consultants and their respective members, directors, officers, agents, employees, successors, and assigns (collectively "Indemnitees") from and against any and all losses, claims, costs, damages, expenses, and attorneys' fees, arising out of or resulting from the performance of the Work, or by Contractor's breach of this Agreement, except to the extent caused by the sole negligence or willful misconduct of any Indemnitee hereunder. The Contractor **and each of its Subcontractors and to all Shared Services Contracts (Purchase Order Agreements)** shall include the Owner, Architect, Construction Manager and their Consultants as Additional Insureds on their casualty and commercial liability insurance policies on a primary and non-contributory basis,

including a waiver of subrogation, acceptable to Owner, and shall not include any exclusions that limit the scope of coverage beyond that provided to the named insured and the endorsement shall not require a written agreement with the Additional Insureds. **Additional** Insured status shall be provided by ISO endorsement CG 20 38 04 13 and CG 20 37.

.4 A copy of the endorsement(s) providing additional insured sections must be attached to the Certificates.

§11.1.3 The Contractor acknowledges that failure to obtain such 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 requirements have been met, prior to the commencement of the work or use of the facilities. Failure to provide said insurance shall cause the immediate suspension of all work and possible cancellation of this contract.

§11.1.4 The Contractor agrees to carry as a minimum the following insurance in such form and with such insurers as are satisfactory to the Owner covering the work hereof:

.1 **Workmen's Compensation and Employers Liability Insurance:** Statutory Workmen's Compensation and Employers Liability insurance coverage as required by the State Law in which the project site is located, and in the state in which the contractor is domicile, and licensed to do business, and for all of his employees to be engaged in work on the project under this contract, and in case such work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation and Employer's Liability insurance for all of the employees to be engaged in such work. Provide Statuary Limits and Coverages

.2 **Commercial General Liability Insurance** Including Premise/Operations, Independent Contractors, Products and Completed Operations, Broad Form Contractual, Broad Form Property Damage, Broad Form General Liability Endorsement and blanket coverage for underground hazards; X (explosion) C (collapse) U (underground).

Minimum Limits:

Each Occurrence :	$1,000,000.00
General & Product Liability Aggregate: (General Aggregate to apply on a per project basis).	$2,000,000.00.
Personal Injury:	$1,000,000.00.
Fire Damage Legal:	$50,000.00.
Medical Payment:	$10,000.00

Other Requirements: No Explosion, Underground, Collapse (XCU) exclusions.

.3 Bodily injury including death arising from any occurrence for the period and time for this specific work contract, including any contractual agreement assuming liability of Owner by terms of contract agreement in an amount of not less than the amount as stated above.

a. Coverage and limits required in no way restrict or relieve the contractor from the full and complete responsibility for all injuries and/or damages and it is suggested that the contractor consult their agent or broker to be certain their coverage, in form and limits, is sufficient for their needs.

.4 **Automobile Insurance**. Business Automobile liability insurance coverage format shall be as required by the state law in which any and all vehicles are registered, and must include all owned, hired or non-owned vehicles in the following amounts:

Minimum limits:

Bodily Injury -	$1,000,000.00 each accident
Property Damage -	$1,000,000.00 each accident
or a combined single limit of	$1,000,000.00

.5 **Conditions of Coverage** Bodily Injury and Property Damage coverage under both General and Automobile Insurance shall include the "occurrence" basis wording. In the event of cancellation of insurance, the Owner shall be given advance notice of 30 days by the insured carrier and such to stipulated in the insurance contract.

.6 **Umbrella Liability.** Limit: **$5,000,000.00** per occurrence and aggregate excess over Underlying Comprehensive General Liability, Automobile Liability, Employers Liability Policies.

.7 **Self-Insured retention** $10,000.00 per occurrence.

.8 **Owner Contractor Protective Liability Insurance (OCP):** If the Contract amount is **greater than $250,000** the Contractor shall purchase and maintain an Owner's Protective Liability policy naming the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. as named insured. The original and duplicate policy shall be filed with Owner and the policy shall remain in effect until the job is formally accepted by the Owner.

Limits of Liability: $1,000,000.00 each occurrence.

$2,000,000.00 aggregate

.9 **Asbestos/Lead/Hazardous Materials Liability Insurance :** With coverage for the services rendered for the district, including, but not limited to removal, replacement enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs in addition to Insurance specified, The Contractor shall provide the following liability insurance:
Workman's Compensation: State: Statuary

Applicable Federal: (e.g., Longshoremen, harbor work, Work at or outside U.S. Boundaries): Statuary

Employer's Liability: $100,000

Said policy shall be endorsed to indicate that the term "Insured" shall include the "Owner" Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. Architects & Planners and be deemed to include their authorities, boards, bureaus, departments and officers thereof in their official capacities.

Said policy shall be endorsed to indicate that the contractor is solely responsible for the premium cost of the policy including any audit adjustments.

Said policy shall contain a 30-day notice of cancellation clause with said notice to be sent to the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. Architects & Planners by certified mail.

Minimum limits:

$2,000,000 per occurrence/$3,000,000, including products and completed operations.If a retroactive date is used, it must pre-date the inception of the contract

If automobiles are to be used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage (ISO endorsement CA 9948) as well as proof of MCS 90:

.10 **Builders Risk:** Unless otherwise provided for hereunder, the Contractor shall purchase and maintain throughout the course of the entire contract, and until final acceptance, a Builders Risk Policy providing a Builder's Risk Coverage Form or Builder's Risk Renovation Form in an amount equal to 100% of the construction replacement cost.
The coverage format shall be the "Special Coverage" form (all risk) naming the Owner, the Contractor and all sub-contractors and suppliers as their interest appear. Loss, if any, shall be payable to the Owner as trustee for all interests. Contractor shall be solely responsible for the cost of any deductible.

.11 **Flood and Earthquake Coverage:** The Contractor, prior to commencing any work on the project, shall ascertain whether the site is subject to the perils of Flood, Mudslide and/or earthquake. If the exposure is present, the Contractor, at his sole cost expense, shall purchase and maintain coverage for the duration of the contract.
The Contractor, prior to signing of the contract, shall provide the Owner and Fuller & D'Angelo, P.C. Architects & Planners with a written report and notice from a P.E. as to the Flood and Earthquake exposures at the site and indicate what coverage, if any is to be provided.

.12 **Equipment, Tools and Supplies:** By signing this contract, the Contractor agrees and understands that he is solely responsible for all loss to any tools, equipment or supplies, owned, rented, or leased, stored at or off the site. Further, the Contractor certifies that he has provided, or will provide notice to this effect to all sub-contractors and suppliers.

§11.1.5 Subcontractors Insurance: The Contractor agrees to provide all sub-contractors with a copy of these insurance requirements and further, agrees to require all subcontractors, manufacturers and suppliers to provide evidence of insurance of the same coverage and limits as are required from the Contractor pursuant to Section 11.1.4.

§11.1.6 The Contractor shall maintain a separate record of each subcontractors' insurance certificates and said records shall be available for inspection by the Owner, Owner's Representative, Construction Manager, and Fuller & D'Angelo, P.C. Architects and Planners for a period of 2 years from the date of final acceptance.

§11.1.7 The contractor shall not permit any subcontractors on the site until acceptable certificates of insurance have been filed and approved.

§11.1.8 Waiver of Subrogation: All property insurance policies carried by the Contractor and his subcontractors shall contain a "Waiver of Subrogation" clause (including equipment floaters) to the effect that the Contractor agrees to waive all rights of subrogation against the Owner, Owner's Representative and Fuller & D'Angelo, P.C. Architects & Planners.

§11.1.9 The signing of this contract acknowledges that the Contractors have notified their insurance carriers accordingly

§11.1.10 Renewal Certificates of Insurance: Renewal Certificates of Insurance must be filed with the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. Architects & Planners **at least** 30 days prior to the expiration of any policy

§11.1.11 Job Safety: The Contractor shall assign one person from his staff to be on the job site safety coordinator. The Contractor is solely responsible for overall job site safety, the safety of his employees and the conduct of his work and that of his subcontractors.

The Contractor agrees to cooperate and comply in full with the insurance representatives of the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. with respect to any safety recommendations or requirements.

The Contractor affirms he is fully versed in all State, Federal and local regulations pertaining to safety including OSHA and Department of Labor regulations, pertaining to his trade and construction operations.

§11.1.12 Products, Completed Operations: The contractor is required to, and agrees to carry Products and Completed Operations coverage.

§11.1.13 Certificates of Insurance shall be filed to this effect, annually with the Owner, Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. and the Contractor shall obtain and record like certificates from his sub- contractors

§11.1.14 Insurance Carriers: All insurance carriers providing coverage on the project must be **licensed** to do business in the State in which the project is located, and in the State in which the Contractor is domicile.
The companies must be Best "Secured" rated or better.

11.1.15 If at any time, any policy required herein shall be or become unsatisfactory to the Owner, as to form or substance, or if the issuing company shall be or become unsatisfactory, the Contractor, upon written notice from the Owner, shall promptly replace said unsatisfactory insurance.

§11.1.16 Failure to provide, maintain or deliver satisfactory insurance during the course of this project, at the election of the Owner, the contract maybe declared suspended, discontinued, or terminated.

§11.1.17 Failure to provide and maintain proper insurance under this contract shall not relieve, nor be construed to conflict with or otherwise limit the contractual obligations of the Contractor

§11.1.18 In the event that any claims, or claims aggregate be in excess of the insured amounts, filed by reasons of any operations under this contract, the Owner, at it's sole opinion, may withhold from payments due or to become due the Contractor amounts equal to the excess of such claims, until the Contractor has provided evidence of additional financial security covering such claims, in a form satisfactory to the Owner.

§11.1.19 All the policies of insurance referred to in this Article 11 shall be issued in the names of the Owners, the Architect, the General Contractor, and his sub-ontractors.. Said policy shall be endorsed to indicate that the term "Insured" shall include the "Owner" Owner's Representative, Construction Manager and Fuller & D'Angelo, P.C. Architects & Planners and be deemed to include their authorities, boards, bureaus, departments and officers thereof in their official capacities. In all cases regarding insurance referred to in these specifications, certificates shall be provided to the Owners, Owner's Representative, Construction Manager and Architects & Engineers

§ 11.2 Owner's Liability Insurance

(Paragraphs deleted)

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

§ 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.

§ 11.4.3 Performance and Payment Bond: As a condition of this Contract the Owner will require the Contractor to furnish a Performance Bond and separate Payment Bond, which shall provide a direct right of action against the surety of a claimant. Each bond shall be a sum equal to **100%** of the Contract Sum and shall be in a form satisfactory to the Owner, and shall be underwritten by a surety company authorized to do business in the State of New York. **The premium for said bond shall be paid for by the Contractor. Refer to Section 00 6000 for additional requirements.**

§11.4.4. Bid Bond: Each individual bid shall be accompanied by a check upon a duly authorized State, National Bank or Trust Company, duly certified in the sum equal to **ten (10%)** percent of the total amount of the bid including "alternates". Bid bond in the amount of **10%** of the bid will be accepted including alternates, payable to the and shall be enclosed in an envelope containing the bid; a guarantee that the Bidder will, after the award is made to him, enter into a bonafide contract with the for the work, and furnish the bonds and liability policies as required under the specifications. If, for any reason, whatsoever, the Bidder fails to enter into a proper contract and to execute the proper bonds, as required, by these specifications, the amount of said guarantee to be retained by the Owner shall be the difference between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work.. **Refer to Section 006000 for additional requirements.**

§11.4.4.1 Each bid bond must also be accompanied by the written consent of the Surety Company authorized to do business in the State of New York.

§11.4.4.2 All certified checks, except the check of the Bidder to whom a contract is awarded, will be returned to the respective Bidders, as soon as the Letter of Intent shall have awarded the contract.

§11.4.4.3 The check of the Bidder to whom a contract has been awarded shall be retained until the contract has been executed and the bonds of the Bidder, together with an approved liability insurance policy are filed the Owner

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 **two (2) years** 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.. 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 two (2) 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 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

This Contract shall be governed by and interpreted in accordance with the substantive laws of the State of **New York**, without recourse to principles of choice of law

§ 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.

§ 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 not bear interest.

§ 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.

§ 13.8 LIENS

If the Contractor or any of its subcontractors or suppliers should cause a Mechanic's Lien to be placed upon the property, then the Contractor shall be liable for any and all legal or bonding or insurance fees related to the removal of the Mechanic's Lien or the defense of any Mechanic's Lien enforcement or foreclosure proceeding. Such legal or bonding or insurance fees shall also be a deduction by the Owner from any moneys due or to become due to the Contractor.

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

§ 14.1.2 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.

(Paragraphs deleted)

§ 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.

.5 If the Contractor fails to satisfy or bond any filed liens against the Owner in the Performance of his contract."

§ 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 and the Contractor will be back charged for all costs incurred by the Owner.

§ 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.

§ 14.2.5 The Owner may take over the work for one of the reasons stated in sub-paragraph 14.2.1 after giving the Contractor and the Contractor's Surety, if any, three days' written notice. The Contractor will be back charged for costs incurred by the Owner

§ 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.

(Paragraphs deleted)

§ 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, and any deposits or down payments which the Contractor has made pursuant to the Agreement which cannot, in the exercise of good faith and due diligence by the Contractor, be refunded or applied as a credit in the Contractor's favor to other charges, provided, however, that if such deposits or down payments are not refundable, Contractor shall assign the applicable contract, agreement, purchase order, etc. to the Owner who, at its election, may require performance of same.

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. As is set forth in other provisions of this Contract, delay in the Contractor's ability to complete the work may, in appropriate circumstances, give rise to a claim for additional time, but will under no circumstances be the basis of a claim for damages.

§ 15.1.2 Notice of Claims. Claims by the 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 must be initiated within 10 days after occurrence of the event giving rise to such Claim.

§ 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

(Paragraphs deleted)

time lines provided herein for the making of claims shall be a condition precedent to any payment for such claims or the granting of any extension of time. Failure of the Contractor to comply with the time and notice provisions of this Article 4.3 shall be an absolute bar to making any payment to or extending the time of the Contractor for such claim. All claims of any type seeking any monies or an extension of time shall be accompanied by full documentation. A claim submittal without full documentation shall be rejected by the Architect and, if not timely resubmitted within the original claim period, as set forth above, shall be waived. .

§ 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 Agreement. A decision by the Architect shall be required as a condition precedent to **the Owner making any payment or granting any extension of time on any** claims between the Contractor and Owner arising prior to the date final payment is due. The Architect will serve as the Initial Decision Maker, unless otherwise indicated 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.

§ 15.2.6 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.

(Paragraph deleted)

§ 15.2.7 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.

(Paragraph deleted)

§ 15.3 Mediation

§ 15.3.1 The parties agree that claims, disputes or other matters in question between the parties to this Agreement, arising out of or relating to this Agreement or the breach thereof shall, before the commencement of litigation or a party availing itself of self-help remedies, be submitted to a third party neutral Mediator agreed to by both parties or, if the parties cannot agree, appointed by the American Arbitration Association, at a non-binding Mediation that shall not exceed one calendar day. The parties may be represented by counsel at the Mediation but no part may engage the Mediator as its representative after the Mediation. Statements made and documents provided or exchanged as part of the Mediation shall be considered to be for settlement purposes only and subject the applicable rules or regulations that govern such matters. All mediation shall take place within 30 days of any demand for same of and cost shall be shared by both parties. .

(Paragraphs deleted)

§ 15.4 Arbitration

§ 15.4.1 The Contractor and the Owner shall not be obligated to resolve any claim or dispute related to the contract by arbitration; any reference to mediation or arbitration in the Contract Documents is deemed void. If a discrepancy is found in the Contract Documents, this paragraph shall be considered the final say.

(Paragraphs deleted)

ARTICLE 16 - NO DAMAGES FOR DELAY

§16.1 Notwithstanding any other terms or conditions set forth in the contract documents, general or supplementary conditions, the contractor agrees to make no claim for damages for delay in the performance of the work occasioned by any act or omission of the owner or any of its representatives, and agrees that any such claim shall be fully compensated for by an extension of time to complete the work, unless a delay is caused by acts of the Owner constituting active interference with the Contractor's performance of the work, and only to the extent such acts continue after the Contractor furnishes the Owner with notice of such interference.

§16.2 Contractor agrees and acknowledges that payment for the work may have been obtained through obligations or bonds which have been sold after public referendum. In the event the work is suspended or canceled as a result of the order of any court, agency, department entity or individual having jurisdiction, or in the event the work is suspended or canceled due to the fact that a court, agency, department, entity or individual having jurisdiction has issued an order, the result of which is that the afore said obligations or bonds are no longer available for payment for the work, contractor expressly agrees that it shall be solely entitled to payment for work accomplished until a notice of suspension or cancellation is served upon the Contractor. Contractor expressly waives any and all rights to institute an action, claim, and cause of action or similar for any damages it may suffer as a result of the suspension or cancellation of the work and/or its contract pursuant to this section."

SPECIAL PROVISIONS

PART 1 GENERAL

1.1 SUMMARY

A. RELATED DOCUMENTS

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

B. These Special Provisions are in addition to the Plans, Specifications, and the other Contract Documents and shall be part of this Agreement. In cases of contradictions, the most stringent Provision shall govern.

1.2 RELATED SECTIONS

A. Section 00 7200 - General Conditions.

B. Section 01 4216 - Definitions.

1.3 SPECIAL PROVISIONS

A. General Requirements:

1. All contractors are required to name the Owner, Architect, Construction Manager, and Architect's Consultants as additional insureds on all casualty and commercial liability insurance coverage required by the Contract Documents, including all primary and excess policies, limits and terms and conditions contained therein, and shall defend, indemnify, and hold harmless the Architect and Construction Manager to the same extent that the Owner is required to be defended, indemnified, and held harmless under the provisions of the Contract Documents. All contractors are to provide in addition to the ACORD Form, an executed ISO Endorsement CG 20 38 04 13 (or an equivalent form not requiring a written contract between the insured and additional insureds) naming The Owner, Architect, Construction Manager, and Architect's Consultants as additional insureds. These requirements will apply to all Shared Services Contracts (Purchase Order Agreements) as well. In addition, each contractor shall execute and deliver to the Architect and Construction Manager written letter agreements in the form annexed hereto confirming such additional insured status.
2. Each Prime Contractor shall provide a full time on site Superintendent or foreman whenever/wherever work is in progress.
3. Each Prime Contractor is responsible for providing its own containers for debris removal, which are to be continuously replaced when full. Waste material is to be deposited in site containers and/or mini-containers, which are provided and disposed by same. All Prime Contractors are responsible to broom clean all areas at the end of each day.
4. All Contractors will be responsible for dust control in connection with their work. Dust control methods to be appropriate for the material to be controlled and the location, subject to the approval of the Owner, Architect, and Construction Manager, and as required by the governing agency. This includes negative air machines and dust-tight partitions as part of contractors' dust control methods.
5. Each Prime is to provide Construction Manager with a list of key personnel (site superintendents and principals) with addresses, telephone and cell numbers for emergency (twenty-four hour) purposes.
6. Provide one (1) week after Notice to Proceed, a cash flow projection for the entire project.
7. All Prime Contractors to provide a list of subcontractors, sub-subcontractors suppliers and vendors with names, addresses, telephone numbers and description of work they shall perform or furnish.
8. Each Prime is to supply, and each employee is to wear, formal ID cards when working on site.
9. All Contractors shall submit their safety plan and corporate safety policy one (1) week after Notice to Proceed. Plan must meet OSHA standards. Owner to receive a copy of each Prime Contractor's safety meeting minutes to be held at least once a week. A person signaling movements at all locations shall control movement of trucks and other construction equipment by flags.

10. One (1) week after Notice to Proceed, all Prime Contractors are to submit a "Site Safety and Logistics Plan". Indicate in this plan delivery/removals access and traffic plan, refuse container location, crane/picker/lifts location(s), temp rated plywood/GWB painted partitions separating construction and work areas, staging and storage areas. Construction staging areas shall be as indicated on drawing or as required for proper separation of the work. Each Contractor shall be allowed to have only one (1) office trailer if approved by the Owner.
11. Mandatory Contractor, Owner, Architect, and Construction Manager coordination meetings will be held once a week, unless specified otherwise. All Prime Contractors are required to attend.
12. Each Prime is responsible for his own storage space at site. Each Contractor will be required to supply and insure storage for their own materials. All costs related to delivery, construction, protection, power, etc. are borne by the individual Contractors utilizing the space.
13. All Contractors shall have a representative on site to accept deliveries of equipment and supplies. Deliveries arriving on site without a Contractor present to accept it, will be turned away. Owner and Construction Manager will not sign delivery tickets.
14. Contractors are to submit Daily Construction Reports to the Construction Manager, detailing manpower and work activities on site. In addition, the Contractors are to submit Two (2) Week Look Ahead Schedules for upcoming work.
15. A schedule of projected fabrication and delivery of long lead items shall be submitted one (1) week after the Notice to Proceed.
16. Progress/Status reports on fabrication and delivery are to be submitted to the Construction Manager every two (2) weeks. A 'Rate of Change' chart and marked-up shop drawings are to be included in these reports.
17. Disconnect / Tie-In work involving ANY utilities that would interfere with the ongoing operations of the building shall be completed after-hours. Utilities are to be restored prior to the opening of the building on the following day with adequate time for the Owner to prepare the building for normal operations. The Construction Manager is to be notified at least 48 hours in advance.
18. Shop drawings / submittals returned to the Contractor for second resubmission require the Contractor to have a two (2) day turnaround on the resubmission. Submittals requiring a second submission will result in charges for additional Architect review time. All returned shop drawings must be sent overnight priority delivery or Electronically.
19. Requests for Information (RFI) are for requests on clarifications or questions on the 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, methods or concepts, substitution or materials, systems means and methods. Each Contractor shall send each RFI (electronically) directly to the Architect and Construction Manager's office concurrently. On the 'date required' section, fill in the exact date the information is needed, not ASAP or immediately. Each Contractor will be responsible to generate an RFI log and update it weekly. Based upon the amount of RFI's received and their level of content, the Architect/Engineer shall establish the level of importance of RFI's and shall be allowed sufficient time, in the Architect/Engineer's professional judgement, to permit adequate review.
20. Except for the basic building permit, the Prime Contractor's bid price shall include all fees and other costs for securing and maintaining (by the Prime Contractors or their subcontractors) for the duration of the project; all permits, PE licenses, connection fees (Gas, Electric, Health Department, Water District or other utilities and services), inspections, etc., applicable to, or customarily secured for the Work.
21. Smoking and alcoholic beverages are expressly prohibited on all of the Owner's properties. All Contractors, Subcontractors and suppliers shall wear photo identification, shirts, long pants and other proper attire while on the Owner's site. All persons representing contractors, subcontractors or suppliers shall conduct themselves in a manner consistent with the rules and policies of the Owner and the governing agency at all times.

22. The Prime Contractors and their subcontractors are to provide their own protection while performing any work.
23. The Prime Contractors shall be responsible for any loss or damage to his property, operations and partially or fully completed work. The Prime Contractor will also maintain every precaution to prevent damage to the work of other Prime Contractors and sub contractors during the course of construction. Damage to work of other Prime Contractors and subcontractors will be charged to the offending party(s).
24. The Electrical Prime Contractor shall provide temporary electric light and power services; typical OSHA an NEC approved temporary light and power services within all the construction areas. All equipment connections and extensions shall be by all the other Prime Contractors.
25. Final cleaning of the Work is the responsibility of the General Contractor after the other Primes remove all of their tools, gang boxes and excess material. General cleaning is required by each Prime Contractor each and every day.
26. All contractors are to take precautions at all times during the progress of the work to prevent water and debris from entering the buildings due to conditions caused by these operations.
27. Contractor is responsible to mobilize immediately on-site to correct any such infiltration and provide clean-up and restoration. Any costs due to damages will be borne by the responsible Prime contractor. Failure to respond in a timely manner will result in a back charge to the contractor for time and expenses of the Owner, Architect, and Construction Manager related to their response to the event.
28. Notwithstanding anything to the contrary contained herein or in the Contract Documents, with respect to each Prime Contractors' or Trade Contractors' own work, the Architect and Construction Manager shall not have control over or charge of the work and Architect and Construction Manager shall not be responsible for construction means, methods, techniques, sequences or procedures, and/or for safety and safety precautions and programs in connection with the work of each of the Prime Contractors or trade contractors, since these are solely the Contractor's and trade contractor's responsibility. The Architect and Construction Manager shall not have control over or charge of acts or omissions of the Prime Contractors, Trade Contractors, subcontractors, or their agents or employees, or any other persons performing portions of the work not directly employed by the Architect and Construction Manager.

B. Coordination:
1. Each Prime Contractor shall generate a complete "Submittal Log" within one (1) calendar week of the Notice to Proceed. This log is to list all required submittals specific to their trade, as detailed in the Project Manual/Specs.
2. Each Prime will be responsible to send all shop drawings, electronically to Submittal Exchange. Refer to Section 01 3000 - Administrative Requirements for additional requirements
3. Each Prime Contractor is responsible to review and stamp all shop drawings reviewed, prior to submission to the Architect. The Architect will not review any shop drawings unless first reviewed by the respective Contractor.
4. Submittals must be submitted by each Contractor with a transmittal letter.
5. All submittals that do not meet the above requirements will be immediately returned with no extension of time for the required submittal.
    a. General requirements for submittals will be as follows:
        a) Each Prime Contractor shall submit to the Architect directly one (1) reproducible, and five (5) copies, of shop drawings/product information, or electronic submissions if acceptable to the Architect. In addition, the Prime Contractor will also send to the Construction Manager, concurrently, one (1) copy of transmittal sent to the Architect.
        b) After Architect and Architect's Consultants review, Architect will send reviewed documents, concurrently, back to the Contractor and to the Construction Manager.

6. Each Prime Contractor will be responsible for distribution of their approved drawings/cuts, in a timely manner, to other Prime Contractors and Sub Contractors, for coordination with their work. Any additional cost generated due to lack of transfer of information will be borne by the Contractor responsible for distribution. In the event the Prime Contractor fails to distribute shop drawings / product information to other Prime Contractors, the Owner reserves the right to have the Architect make the necessary copies and ship via overnight delivery to the parties involved. All costs incurred will be backcharged to the Prime Contractor responsible for not distributing shop drawings / product information. Each Prime Contractor is responsible for coordinating their work with all other Prime Contractors. No additional cost requests will be considered due to lack of coordination between the Prime Contractors.
7. The Prime Contractor shall be responsible for all cutting, fitting and patching as required to perform their work in accordance with the Contract Documents and project schedule. In the event that others will perform cutting, fitting and patching, these costs shall be charged to the Prime Contractor responsible for the work.
8. Where material is specified to be furnished by others or furnished and delivers only, the Prime Contractor installing the material shall be responsible for scheduling the delivery, receiving, unloading, storing, handling, relocating, hoisting, distribution, laying out and installing. Upon receipt by the Prime Contractor installing the material, risk of loss and damage shall be borne by that contractor.
9. The Prime Contractor is advised to exert utmost care and diligence when working in or near any existing buildings or sitework that is to remain. The absence of protection around such items shall not excuse the Prime Contractor from their liability to provide protection. Any damages to the existing buildings, site work or facilities shall be repaired and expense to the responsible Prime Contractor.

C. Milestone Dates:
1. One (1) week after notice to proceed the General Contractor or Lead Prime Contractor, as determined by the Architect and Construction Manager, shall submit a detailed schedule for review / approval by the Architect and Construction Manager. The Prime Contractor shall include all milestones and long lead items on the schedule. One (1) week after receipt of the preliminary schedule all other Prime Contractors are required to review and comment on the schedule. Upon receipt of all comments, the Prime Contractor responsible for producing the schedule, shall incorporate all changes and distribute copies to all Primes, Architect and Construction Manager.
2. Failure to meet intermediate milestone dates will jeopardize the overall Project Schedule and will require the Contractor(s) to work overtime at the cost of those Contractor(s) responsible for such delays. In addition, all costs due to delays in completion of the work which require additional Owner, Architect, and Construction Manager services beyond the work duration in Project Bid Schedule shall be borne by Contractor(s) responsible for delays as per General Conditions of the contract for construction.
3. The Contractor acknowledges that time is of the essence and shall supply substantial manpower as required to meet the milestone dates. The Owner reserves the right to carry out work or augment labor force as required when, by the Owner’s judgment; it becomes apparent that milestone dates may not be met

D. Site Access and Controls:
1. The construction personnel shall park in designated locations only.
2. All construction personnel shall wear photo identification badges while on site. The badges shall include a color picture of the employee, employees name, company name and project name.
3. The Prime Contractors, subcontractors and suppliers shall not place signage on any portion of the Project or on any property surrounding the Project.
4. The Prime Contractor is solely responsible for the protection of its own material, equipment, tools and personal belongings while these items are on the premises.

5. The Prime Contractor shall be responsible for securing appropriate space for storing their material on site. Should insufficient space be available on site the Prime Contractor shall store its material off site, any costs associated will be the responsibility of the Prime Contractor. The Owner and Construction Manager shall designate all locations for use by the Prime Contractors

E. Test And Controls:
1. If the Architect or Owner determines that in addition to what is specified elsewhere in project manual, any work which requires special inspection, testing or approval, the Construction Manager will instruct the Prime Contractor of such special inspection or testing. If such special inspection or testing reveals a failure of the work to comply with the requirements of the Contract Documents, the Prime Contractor shall bear all costs thereof, including compensation for the Architect and Construction Manager and Testing Lab.
2. Contractor shall furnish incidental labor to:
   a. Provide access to the work to be tested, sampled, and inspected.
   b. Obtain and handle samples at the project site or at the source of the product to be tested.
   c. Facilitate inspections, samplings, and tests.
   d. Coordinate with the Construction Manager and testing lab, and submit schedule of required tests one (1) week in advance.
   e. Coordinate inspections with the testing laboratory.
3. The Prime Contractor shall coordinate independent testing and inspections. If any Prime fails to coordinate such inspections and additional costs are incurred to the Owner, the Prime will be responsible for that inspection cost. Architect and Construction Manager shall be notified 48 hours prior to the need of testing. In the event the Contractor does not give proper notification and the work is done with no test, that Contractor will bear all costs for subsequent testing of installed materials.
4. NOTE: All testing costs will be paid for by the Owner, except as noted above.

F. Schedules of Values:
1. Within one (1) week after Notice to Proceed, the Prime Contractor shall submit a detailed billing breakdown on AIA G702 form for approval by the Construction Manager. No payments will be made until such billing breakdown is approved.
2. The Schedule of Values will be reviewed and adjusted if necessary. Once approved, the Schedule of Values is to be used for the AIA payment application. The Schedule of Values will take into account and include at minimum the following items divided into separate distinct categories.
   a. Bond/Insurance based on actual invoice amount.
   b. Labor and material on line items as applicable.
   c. Submittals - 1% of contract sum.
   d. Punch List - 1% of contract sum.
   e. Close-Out documents/warranties - 2% of the contract sum.
   f. Supervision and Meetings
   g. Operating and Maintenance Data
   h. Allowances
   i. Alternates
3. NOTE: Punch List value will be dispersed only when the work has been confirmed to be completed 100%
   a. The Owner will not reduce or pay any retainage until all work is complete including punch list.

G. Punch List:
1. Upon substantial completion, the Prime Contractors are to submit to the Architect and Construction Manager a letter declaring that the work is substantially complete. Included with the letter is to be the Contractor's Punch List. Upon the receipt of above, the Construction Manager

will schedule with the Owner, Architect, and Construction Manager, and Contractor, a walk-through to develop a single final Punch List two (2) days after receipt of letter. This single final Punch List agreed by all parties shall serve as the only Punch List. Upon failure to complete the final Punch List within two (2) weeks from receipt, the Owner reserves the right to complete same and backcharge the costs of material, labor, supervision, and other incidental costs to the Contractor.

H. Hours of Work:

1. All Contractors normal work hours for non-occupied areas (if specifically authorized by the Owner) shall be weekdays from 7:00 a.m. - 4:00 p.m. The Owner and Construction Manager shall be notified 48 hours in advance of any Contractor's request to work before or after normal work hours or during the weekend. The Contractor shall be responsible for all additional costs related to off-hours work to include, but not be limited to, the Owner, Architect, and Construction Manager, Testing Labs, etc. (at Owner's discretion).
2. Any work that is required to be performed Monday through Friday in occupied areas of the building or site shall be performed between 3:00 PM and 11:00 PM unless otherwise dictated or authorized by the Owner, or at a time agreed to on Saturday and Sunday. All such work shall be included in the Contractors' base price and shall appear on the Prime Contractors' detailed work schedules and two-week look-ahead schedules. At the end of each daily work periods, the Prime Contractor shall be responsible for returning these spaces back to their original condition or to a condition previously agreed to by the Owner that will not hinder the regular activities of the Owner.
3. All Prime Contractors must observe any required dates and times when no work activity will be allowed on-site due to the Owner's request and activities that take place in the building. Dates and times will be provided as soon as possible during the course of the project; however, no claim will be entertained for short notice to the Contractors for limiting or prohibiting the temporary suspension of construction activities.

1.4 LETTERS OF AGREEMENT

A. The following letters shall be acknowledged and executed by each Prime contractor upon award of a contractor:

SCHOOL CONSTRUCTION CONSULTANTS, INC.

190 MOTOR PARKWAY #200

HAUPPAUGE, NY 11788

Date: _____

_____

[Insert Contractor Name and Address]

Re: Additions, Alterations And Related Work (the "Project")

Dear Sir/Madam:

Reference is made to your contract ("Contract") with Port Chester-Rye UFSD ("Owner") 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 School Construction Consultants 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 School Construction Consultants, Inc., to the same extent that you are required to hold harmless, indemnify and defend the Owner under the Contract.

B. Please acknowledge your consent by signing your name below.

Very truly yours,

_____

William Reece

Acknowledged and Agreed to by:

_____, as Contractor

By: _____

Name: _____

Title: _____

FULLER AND D'ANGELO, P.C.
ARCHITECTS AND PLANNERS
45 KNOLLWOOD ROAD SUITE 400
ELMSFORD, NY 10523

Date _____

[Insert Contractor Name and Address]

Re: Additions, Alterations And Related Work (the "Project")

Dear Sir/Madam:

Reference is made to your contract ("Contract") with Port Chester-Rye UFSD ("Owner") 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 Fuller and D'Angelo, P.C. Architects and Planners 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 Fuller and D'Angelo, P.C. Architects and Planners to the same extent that you are required to hold harmless, indemnify and defend the Owner under the Contract.

Please acknowledge your consent by signing your name below.

Very truly yours,
Joseph Fuller, Jr. AIA

Acknowledged and Agreed to by:

_____, as Contractor

By: _____

Name: _____

Title: _____

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SUMMARY OF CONTRACTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PROJECT

A. Project Name: Additions, Alterations And Related Work

B. Facility Name: Port Chester High School

C. Owner: Port Chester-Rye UFSD.

D. Architect: Fuller and D'Angelo P.C.

E. The Project consists of the Additions, Alterations And Related Work and Related Work at the Port Chester High School, 1 Tamarack Road, Port Chester, New York 10753.

F. The work at the High School includes but is not limited to:

1. New steel frame structures, masonry clad additions and related work.
2. Academic space includes new Corridors, Classrooms, Band, Choral, Science and other Instructional spaces and Toilets.
3. Connector Bridges and stairs.
4. New Gymnasium and Entry with bleachers and Locker rooms with toilets.
5. Elevators. One in Academic Space and one in the existing building.
6. Alterations and renovations to existing interiors as indicated on drawings.
7. New Paving, walks, concrete grandstand alterations and additional site work as indicated on drawings.

1.3 DEFINITIONS

A. Refer to Section 07200 General Conditions and Section 01 4216 for Definitions.

1.4 CONTRACT DESCRIPTION

A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as described in herein.

B. Multiple contracts are separate contracts, representing significant construction activities, between Owner and separate contractors. Each contract is performed concurrently and coordinated closely with construction activities performed on Project under other contracts. Contracts for this Project include the following:

1. Contract #1 General Construction including asbestos abatement.
2. Contract #2 Plumbing. including sprinkler system.
3. Contract #3 Heating, Ventilating, Air-Conditioning.
4. Contract #4 Electrical.

C. The work of each Contractor is identified in this Project Manual and on the Drawings.

D. Local custom and trade-union jurisdictional settlements do not control the scope of Work included in each prime contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, the affected contractor(s) shall promptly negotiate a reasonable settlement to avoid or minimize the pending interruption and delays.

E. If it becomes necessary to refer to the contract documents to determine which prime Contract includes a specific element of required work, begin by referring to the prime Contracts, themselves; then, if a determination cannot be made from the prime Contracts, refer, in the following order, to the Supplementary Conditions, this section of the Specifications, followed by the other Division-l sections and finally with the Drawings and other Sections of the Specifications.

F. If, after referring to the contract documents, it cannot be clearly determined which prime Contractor will perform a specific item of required work, then, that item of work will be brought to the Architect's attention in writing for determination.

G. Summary by References: Work of the prime contracts can be summarized by reference to the prime contract(s), General Conditions, Bidding Requirements, Specification sections, Drawings, Addenda , or Modifications to Contract Documents issued subsequent to the initial printing of this Project Manual, and including but not necessarily limited to printed material referenced by any of these. It is recognized that the work of the prime Contracts is unavoidably affected or influenced by governing regulations, natural phenomenon, including weather conditions, and other forces outside the contract documents.

1.5 RELATED REQUIREMENTS

A. Section 00 5200 - Form of Agreement: Contract Sum, retainages, payment period.

B. Section 00 7200 - General Conditions: Additional requirements for progress payments and Changes in the Work.

C. Section 00 7310 - Special Provisions.

D. Section 01 1010 - Milestone Schedule.

E. Section 01 2000 - Price and Payment Procedures.

F. Section 01 2100 - Allowances.

G. Section 01 2300 - Alternates: Payment procedures relating to alternates.

H. Section 01 3553 - Site Safety and Security Procedures.

I. Section 01 5000 - Temporary Facilities and Controls.

J. Section 01 7000 - Execution.

K. Reference Drawing - Site Safety and Logistic Plan.

1.6 JURISDICTIONAL DISPUTES

A. It is not the intention of these specifications to transgress the jurisdictional arrangements regarding the division of work between the several trades. Should it appear, however, that these specifications imply that other trades are to perform work which is claimed by any other trades, each Contractor affected shall notify the Architect and Construction Manager of such fact when submitting his proposal, indicating the additional amount required to include the work in question in the Base Bid. In the event that no such notification is received prior to an acceptance of the Contractor's Proposal, it will be construed that the specifications imply nothing which is unacceptable to the various trades and no extra payments on this account will be granted to any Contractor during the progress of the job.

B. Each Contractor shall only employ labor on the project or in connection with its work capable of working harmoniously will all trades, crafts and any other individuals associated with the capital improvement work to be performed. There shall be no strikes, picketing, work stoppages, slowdowns or other disruptive activity at the project for any reason by anyone employed or engaged by the Contractor to perform its portion of the work. There shall be no lockout at the project by the Contractor. The Contractor shall be responsible for providing the manpower required to proceed with the work under any circumstance. Should it become necessary to create a separate entrance for a contractor involved in a labor dispute, all costs associated with creating that entrance shall be borne by the contractor involved in the dispute. Such costs shall include, but not be limited to, signage, fencing, temporary roads and security personnel as deemed necessary by the Owner for the safety of the occupants of the site.

C. If the Contractor has engaged the services of workers and/or subcontractors who are members of trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage or cost to the Owner and without recourse to the Architect or the Owner, any conflict between its agreement with the Owner and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the work of any particular trade.

D. The Contractor shall ensure that its work continues uninterrupted during the labor dispute and will be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes or strikes.

1.7 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is shown on drawings.

B. Scope of alterations work is indicated on drawings.

C. Existing Systems: Alter existing system and add new construction, keeping existing in operation
1. Plumbing.
2. HVAC including ATC systems
3. Electrical Power and Lighting.
4. Fire Alarm.
5. Telephone and data.
6. Security System
7. Access Control.

D. Port Chester-Rye UFSD will remove and re-install, from all existing rooms being renovated, the following before start of work:
1. TV's, smart boards, furniture, books and clocks.

1.8 OWNER OCCUPANCY

A. Refer to reference drawing "Site Safety and Logistics Plan"

B. Port Chester-Rye UFSD intends to continue to occupy adjacent portions of the existing building during the schhol year and times when construction is restricted. Fefer to paragraph 1.9.F.

C. No summer programs or athletic programs will be scheduled in the summer of 2019 and 2020.

D. Cooperate with Port Chester-Rye UFSD to minimize conflict and to facilitate Port Chester-Rye UFSD's operations.

E. For the year 2020 the contractor shall allocated the same number of days and times. When the days and time have been determined the contractors will be advised.

F. Schedule and coordinate all Work to accommodate Owner's occupancy with the Construction Manager.

1.9 CONTRACTORS USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas of work as directed by Construction Manager.

B. **Refer to "Site Safety and Phasing Plans".**

C. Arrange use of site and premises to allow:
1. Port Chester-Rye UFSD occupancy.
2. Work by Others.
3. Work by Port Chester-Rye UFSD.
4. Use of site and premises by the public.

D. Provide access to and from site as required by law and by Port Chester-Rye UFSD:
1. Emergency Building Exits During Construction: Keep all exits required by code or directed by the Construction Manager, open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

E. Existing building spaces may not be used for storage unless approved by the Owner.

F. **Time Restrictions:**
1. Limit conduct of especially noisy exterior work to the hours of 3:30 pm to 8:00 PM..

2. Owner's representative(s) will cover the project for the standard 8 hour Monday-Friday shift. If contractor requests additional hours **to make up schedule time** or weekends, he will need to reimburse owner for any additional coverage or costs (e g - Construction Manager, custodian, security) at their contractual rates.
3. Contractors will be restricted from construction activities as follows:

	Date	Hour of Work Permitted
a.	March 29, 2019:	7:00 AM to 4:00 PM.
b.	April 1, 2019:	7:00 AM to 4:00 PM.
c.	April 4-6, 2019:	7:00 AM to 4:00 PM.
d.	May 4, 2019:	4:00 PM to 10:30 PM
e.	May 6-24, 2019:	No work Permitted.
f.	May 9, 2019:	7:00 AM to 4:00 PM.
g.	June 1, 2019:	4:00 PM to 10:30 PM.
h.	June 3, 2019:	No work Permitted.
i.	June 4, 2019:	7:00 AM to 4:00 PM
j.	June 8, 2019:	4:00 PM to 10:30 PM.
k.	June 17-25, 2019:	No work Permitted
l.	August, 13-14, 2019:	No work Permitted.
m.	January 9, 2020:	7:00 AM to 4:00 PM.
n.	January 22-25, 2020:	No work Permitted
o.	February 4, 2020:	7:00 AM to 4:00 PM
p.	February 5, 2020:	7:00 AM to 4:00 PM
q.	February 13, 2020	7:00 AM to 4:00 PM
r.	February 14, 2020:	7:00 AM to 4:00 PM
s.	February 28, 2020:	7:00 AM to 4:00 PM.
t.	March 4, 2020:	7:00 AM to 4:00 PM.
u.	March 9, 2020:	4:00 PM to 10:30 PM.
v.	March 20, 2020:	7:00 AM to 4:00 PM.

4. For the year 2020 the Contractors shall be restricted for the the same times. he specific dates will be provided when scheduled by the Owner.

G. Contractors shall comply with Local Noise Ordinance. Work disrupting the community must be performed with the following hours:
   1. The Port Chester High School is within the boundaries of the Villages of Port Chester and Rye Brook
   2. The Village of Rye Brook Noise Ordnance: (Ordinance available on Village web site)
      a. No person, individual, firm, or corporation shall operate any construction equipment, machinery, tool or other device that makes noise audible beyond the property on which it is located except during the following hours and except as provided in § 158-5:
         a) Weekdays (except holidays) between 8:00 a.m. and 6:00 p.m. or dusk, whichever is earlier.
         b) Saturdays (except holidays) between 9:00 a.m. and 4:00 p.m.
         c) Sundays and holidays, no hours of operation.
   3. The Village of Port Chester Noise Ordnance: (Ordinance available on Village web site).
      a. Weekdays between 8:00 a.m. and 8:00 p.m.
      b. Holidays and weekends between 10:00 a.m. and 7:00 p.m.

H. Construction deliveries shall not occur during the hours of 7:30 AM and 9:00 AM and 2:00 PM and 3:00 PM, when school buses are arriving or leaving the school grounds.

I. During the entire construction period the prime contractors shall have limited use of the premises for construction operations, including use of the site as indicated in phasing and schedule of work time table included in this section.

1. General: Limitations on site usage as well as specific requirements that impact utilization are indicated on the drawings and/or by other contract documents. In addition to these limitations and requirements, the Construction Manager shall administer allocation of available space equitably among the separate prime contractors and other entities needing access and space, so as to produce the best overall efficiency in performance of the total work of the project. Each Prime Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.
2. The Prime Contractors shall limit their use of the premises to the work indicated, so as to allow for Owner occupancy and use by the public during the period when the Owner occupies the building.
3. Contractors are to maintain clear and unobstructed paths of exit discharge from all existing exits.
4. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials.
5. Lock automotive type vehicles such as passenger cars and trucks and other types of mechanized and motorized construction equipment, when parked and unattended, to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

J. Only materials and equipment, which are to be used directly in the work, shall be brought to and stored on the project site by the Contractor. After equipment is no longer required for the work, it shall be promptly removed from the project site. Protection of construction materials and equipment stored at the project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractors.

K. Site work shall be scheduled and coordinated with Construction Manager. The Construction Manager decisions shall be final and binding on all contractors.

1. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction

L. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated or directed by . If additional storage is necessary obtain and pay for such storage off-site.

M. The Contractor(s) and any entity for which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Construction Manager, which may be withheld in the sole discretion of the Construction Manager.

N. Contractor shall ensure that the work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the work and all adjacent areas. The work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, each contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of:

1. Any areas and buildings adjacent to the site of the work or;
2. The Building in the event of partial occupancy as more..

O. Without prior approval of the Owner and Construction Manager, each Prime Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitations, lavatories, toilets, entrances and parking areas other than those designated by the Construction Manager. Without limitation of any other provision of the Contract Documents, Each Contractor shall use its best efforts to comply with the rules and regulations promulgated by the Owner and Construction Manager in connection with the use and occupancy of the Project Site, and the Building, as amended Owner from time to time.

Each Contractor shall immediately notify the Construction Manager in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same results intended by such portions of the rules and regulations can be achieved. Construction Manager may, in the Construction Manager's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations. Each Contractor shall also comply with all insurance requirements, applicable to use, and occupancy of the Project Site and the Building.

P. Maintain the existing building in a safe and weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period. When work is scheduled after hours clean and remove all temporary barriers and protection so that the building can be occupied the following day when normal building occupancy will occur.

Q. Keep public areas such as hallways, stairs, elevator lobbies, and toilet rooms free from accumulation of waste material, rubbish or construction debris.

R. Smoking, drinking of alcoholic beverages or open fires will not be permitted on the project site.

S. Utility Outages and Shutdown:

1. Limit disruptions, shut downs, switch overs, etc. of utility services to hours the building is unoccupied, Saturdays, Sunday and/or holidays. Arrange at least 72 hours in advance with Port Chester - Rye UFSD.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers, fire alarm system, electrical, data, and heatiing system, without 7 days notice to Port Chester-Rye UFSD and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.10 AVAILABILITY OF EXISTING BUILDING

A. The existing site and building work areas will be available to the Contractor(s) as follows:

1. Notice of Award Prior to Start of Construction
   a. 7:00 AM to 4:00 PM Monday thru Friday only when programs and school occupancy are not disrupted and with the approval of the Owner.
2. Start of Construction to Completion date.
   a. 7:00 AM to 10:30 PM Monday thru Saturday, except for restricted times as listed in paragraph 1.9.F.
   b. **Work will only be permitted after 4:00 PM and Saturday if the contractor(s) has worked 7:00 AM to 4:00 PM Monday thru Friday and 4:00 PM to 10:30 PM is approved by the Construction Manager.**
   c. When the facility is closed Contractors may work providing no access into the existing facility is required. Access to the building may be authorized if requested 48 hours in advance to the Construction Manager and cost for school personnel is paid for by the Contractor.
3. After Scheduled Completion Date
   a. 4:30 PM thru 10:30- PM Monday thru Saturday only when programs and school occupancy are not disrupted and with the approval of the Construction Manager.
4. Construction operation which create dust, noise or fumes, particularly welding operations shall be scheduled after school hours, when directed by the Construction Manager.
5. **Asbestos abatement shall be performed when the building is unoccupied.**

B. Upon request by the Contractor, the building may be made available, at the discretion of the Construction Manager, and at the Cost to the Contractor, during such times as are allowed by local noise ordnance, in addition to the above listed hours. A request for use during these off-regular hours must be made at least two (2) days before the use. Such off-hours may include Sundays and Holidays.

C. If the Contractor requests the use of the facility for off-hours to maintain the scheduled completion date, the Contractor shall pay all additional costs in connection with opening, providing security and project management expenses incurred with no costs to the Owner. All expenses shall be deducted from the Contractors contract price. Comply with other portions of this Section.

1. Weekend, Holiday and Night Work:

a. The contractor shall make no claim for delay for the inability of the Construction Manager to make the site available for off-hours work. Should the Construction Manager make the site available during these hours at the contractor's request, the cost will be borne by the Contractor.

D. ALL CONTRACTORS SHALL BE REQUIRED TO PERFORM SCHEDULED WORK WITHIN THE EXISTING BUILDING ONLY DURING THE TIME PERIODS INDICATED AND SHALL INCLUDE IN THE BID ALL COSTS FOR LABOR, MATERIAL, ETC. INCLUDING PREMIUM TIME TO PERFORM THE WORK, PER PHASE PER TIME PERIOD TO MEET THE MILESTONE COMPLETION DSATES.

1.11 COMPLETION OF WORK AFTER SCHEDULED COMPLETION DATE

A. Contractor(s) shall perform work only within these limitations and all manpower, equipment, etc., shall be provided as required to complete the work as per schedule. In the event the contractor does not complete the work as scheduled all work to be performed shall be performed after 4:30 PM when the building is unoccupied and approved by the Construction Manager. All costs shall be borne by the Contractor.

B. Each Contractor shall prepare a progress schedule in detail listing items of work, sections of building and the time required for each.

C. Each Contractors shall provide necessary manpower, equipment, etc., as required to maintain schedule developed within the time limitations as described above.

D. School Calender is available on the Owner's web site. Calendar is subject to modifications for civil service holidays, changes in education programs, snow days, etc.

1.12 WORK SEQUENCE

A. Refer to Section 01 1010 - Milestone Schedule.

1.13 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, ALL Provisions of Division 00 and 01 listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 0115 LIST OF DRAWING SHEETS
00 2113 BIDDING REQUIREMENTS
00 2115 RFI FORM
00 4100 BID FORM - CONTRACT #1 - GENERAL CONSTRUCTION
00 4110 BID FORM - CONTRACT #2 - PLUMBING CONTRACTOR
00 4120 BID FORM - CONTRACT #3 - MECHANICAL CONTRACTOR
00 4130 BID FORM - CONTRACT #4 - ELECTRICAL CONTRACTOR
00 4401 QUALIFICATIONS OF BIDDERS
00 4460 CERTIFICATION OF COMPLIANCE WITH THE IRAN DISINVESTMENT ACT
00 4470 DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT.
00 4476 INSURANCE CERTIFICATION
00 5200 FORM OF AGREEMENT
00 6000 BONDS AND CERTIFICATES
00 7200 GENERAL CONDITIONS
00 7310 SPECIAL PROVISIONS

DIVISION 01 - GENERAL REQUIREMENTS

- 01 1000 SUMMARY OF CONTRACTS
- 01 1010 MILESTONE SCHEDULE
- 01 2000 PRICE AND PAYMENT PROCEDURES
- 01 2005 PARTIAL RELEASE OF LIEN
- 01 2100 ALLOWANCES
- 01 2300 ALTERNATES
- 01 2500 SUBSTITUTION PROCEDURES
- 01 3000 ADMINISTRATIVE REQUIREMENTS
- 01 3216 CONSTRUCTION PROGRESS SCHEDULE
- 01 3306 NON-DISCRIMINATION CLAUSES
- 01 3307 SED SPECIAL REQUIREMENTS
- 01 3553 SITE SAFETY AND SECURITY PROCEDURES
- 01 3554 PREVAILING WAGE RATES
- 01 4000 QUALITY REQUIREMENTS
- 01 4100 REGULATORY REQUIREMENTS
- 01 4216 DEFINITIONS
- 01 4219 REFERENCE STANDARDS
- 01 4533 SPECIAL INSPECTIONS AND STRUCTURAL TESTING
- 01 5000 TEMPORARY FACILITIES AND CONTROLS
- 01 5213 FIELD OFFICES AND SHEDS
- 01 5500 VEHICULAR ACCESS AND PARKING
- 01 5527 TRAFFIC MAINTENANCE AND PROTECTION
- 01 5719 TEMPORARY ENVIRONMENTAL CONTROLS
- 01 5721 INDOOR AIR QUALITY CONTROLS
- 01 5813 TEMPORARY PROJECT SIGNAGE
- 01 6000 PRODUCT REQUIREMENTS
- 01 6116 VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS
- 01 6180 PRODUCT STANDARDIZATION
- 01 6190 MATRIX OF BUILDING SYSTEM RESPONSIBILITY
- 01 7000 EXECUTION
- 01 7310 CUTTING AND PATCHING
- 01 7330 SELECTIVE REMOVALS
- 01 7420 SITE WASTE HANDELING
- 01 7419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
- 01 7600 PROCEDURES AND SPECIAL CONDITIONS FOR SEPARATE PRIME CONTRACTS
- 01 7800 CLOSEOUT SUBMITTALS
- 01 7900 DEMONSTRATION AND TRAINING
- 01 9113 GENERAL COMMISSIONING REQUIREMENTS

APPENDIX

- LIMITED ASBESTOS SURVEY & LEAD-BASED PAINT INSPECTION (Dated 8/10/17)
- LEAD BASED PAINT SURVEY (Dated 9/25/18)
- GEOTECNICAL REPORT
- BORINGS
- 155.5 UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE

1.14 CONTRACT #1 - GENERAL CONSTRUCTION Sections to be updated

A. The work of the General Construction Contract includes but not limited to the following:

DIVISION 02 - EXISTING CONDITIONS
- 02 080 ASBESTOS REMOVAL AND DISPOSAL

DIVISION 03 - CONCRETE
- 03 3000 CAST-IN-PLACE CONCRETE
- 03 5400 CAST UNDERLAYMENT

DIVISION 04 - MASONRY
- 04 0511 MORTAR AND MASONRY GROUT
- 04 2000 UNIT MASONRY
- 04 2300 GLASS UNIT MASONRY
- 04 7200 CAST STONE MASONRY

DIVISION 05 - METALS
- 05 1200 STRUCTURAL STEEL
- 05 3100 STEEL DECKING
- 05 4000 COLD-FORMED METAL FRAMING
- 05 5000 METAL FABRICATIONS
- 05 5100 METAL STAIRS
- 05 5213 PIPE AND TUBE RAILINGS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
- 06 1000 ROUGH CARPENTRY
- 06 1010 ROOF RELATED ROUGH CARPENTRY

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
- 07 1113 BITUMINOUS DAMPPROOFING
- 07 1300 SHEET WATERPROOFING
- 07 2100 THERMAL INSULATION
- 07 2400 EXTERIOR INSULATION AND FINISH SYSTEMS
- 07 2500 WEATHER BARRIERS
- 07 4113 METAL ROOF PANELS
- 07 4213 ALUMINUM SOFFIT PANELS
- 07 5010 MODIFICATIONS TO EXISTING ROOFING
- 07 5323 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)
- 07 6200 SHEET METAL FLASHINGS & SPECIALTIES
- 07 7123 MANUFACTURED GUTTERS AND DOWNSPOUTS
- 07 7200 ROOF ACCESSORIES
- 07 8100 APPLIED FIREPROOFING
- 07 8400 FIRESTOPPING
- 07 9200 JOINT SEALANTS
- 07 9513 EXPANSION JOINT COVER ASSEMPLIES

DIVISION 08 - OPENINGS
- 08 1113 HOLLOW METAL FRAMES
- 08 1416 FLUSH WOOD DOORS
- 08 1613 FIBERGLASS DOORS AND ALUMINUM FRAMES
- 08 3323 OVERHEAD COILING DOORS
- 08 4313 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 4413 GLAZED ALUMINUM CURTAIN WALLS
08 5113 ALUMINUM WINDOWS
08 7100 FINISH HARDWARE
08 8000 GLAZING
08 8717 SAFETY AND SECURITY GLAZING FILMS
08 9100 LOUVERS
08 9200 LOUVERED EQUIPMENT ENCLOSURES

DIVISION 09 - FINISHES
09 2116 GYPSUM BOARD ASSEMBLIES
09 6262 GYPSUM SHEATHING
09 3000 TILING
09 5100 ACOUSTICAL CEILINGS
09 5440 STUCCO SOFFIT SYSTEM
09 6429 WOOD STRIP AND PLANK FLOORING
09 6500 RESILIENT FLOORING
09 6813 TILE CARPETING
09 9113 EXTERIOR PAINTING
09 9123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES
10 1101 VISUAL DISPLAY BOARDS
10 1400 SIGNAGE
10 2113 PLASTIC TOILET COMPARTMENTS
10 2601 WALL AND CORNER GUARDS
10 2800 TOILET AND BATH ACCESSORIES
10 4400 FIRE PROTECTION SPECIALTIES
10 5100 LOCKERS
10 8200 GRILLES AND SCREENS

DIVISION 11 - EQUIPMENT
11 3013 APPLIANCES AND EQUIPMENT
11 4000 FOOD SERVICE EQUIPMENT
11 4001 CUSTOM FABRICATED FOOD SERVICE EQUIPMENT
11 5213 PROJECTION SCREENS
11 6001 STAGE EQUIPMENT
11 6020 AUDIO VISUAL
11 6623 GYMNASIUM EQUIPMENT

DIVISION 12 - FURNISHINGS
12 2940 ROLLER SHADES
12 3200 PLASTIC LAMINATED CASEWORK
12 3553 WOOD LABORATORY CASEWORK
12 3600 SOLID SURFACING WINDOW SILLS AND COUNTERTOPS
12 4813 ENTRANCE FLOOR MATS AND FRAMES
12 6613 TELESCOPING BLEACHERS

DIVISION 13 - SPECIAL STRUCTURES
13 2000 SPECIAL PURPOSE ROOMS
13 3126 GRANDSTANDS AND BLEACHERS
13 3435 PREFABRICATED CANOPY

13 4800 SOUND, VIBRATION, AND SEISMIC CONTROL

DIVISION 14 - CONVEYING EQUIPMENT

14 2100 ELECTRIC TRACTION ELEVATORS
14 2400 HYDRAULIC ELEVATORS

DIVISION 31 - EARTHWORK

31 1000 SITE PREPARATION
31 2301 EXCAVATION, BACKFILL AND COMPACTION
31 2513 EROSION AND SEDIMENT CONTROL
31 6329 DRILLED CONCRETE PIERS

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 1216 ASPHALT PAVING
32 1313 CONCRETE PAVING AND CURBS
32 1714 TRAFFIC SIGNS
32 1723.13 PAVEMENT MARKINGS
32 1726 TACTILE WARNING SURFACING
32 1810 EROSION CONTROL AND INSPECTIONS OF SEDIMENT CONTROLS
32 1824 OUTDOOR GAME EQUIPMENT
32 3113 CHAIN LINK FENCING AND GATES
32 9210 RESTORATION OF TURF AREAS

DIVISION 33 - UTILITIES

33 1117 DUCTILE IRON WATER PIPE
33 3102 SANITARY MANHOLES
33 3103 DRAINAGE PIPE (SANITARY)
33 3913 DRAINAGE STRUCTURES WITH FRAMES AND COVERS
33 3914 PLASTIC DRAINAGE STRUCTURES
33 3915 MECHANICAL SEPARATOR
33 4914 PLASTIC DRAINAGE CHAMBERS

B. **Special Notes: Contract #1 GC - GENERAL CONTRACTOR**

1. **New storm drainage chambers must be completed and functioning prior to any new storm drainage (Roofs, Parking Areas etc.) connections to the new plastic drainage chambers. No new storm drainage shall be connected to the existing storm drainage system.**
2. Access doors furnished by trade requiring access; installation by General Contractor in new walls, floor, ceiling, etc., Access door required in existing walls, floors, ceilings, etc., shall be furnished and installed by the contractor requiring access.
3. All existing ceiling removal /replacements necessary to install General Contractor work will be by General Contractor including temporary support for all lighting fixtures, smoke detectors, etc.
4. General Contractor and subcontractors will not be allowed to use existing or new plumbing fixtures to wash out mortar pans, grout, adhesives, etc.
5. All new roof curbs are supplied by Mechanical Contractor and installed by General Contractor. Cutting penetrations, steel support, and temporary weather protection by General Contractor. Curbs will be flashed / watertight in accordance with roofing section. Hole patching (structural, EPDM, etc.) for roof areas which result from Mechanical demolition of existing rooftop units will be by Contract for General Contractor.
6. General Contractor will restore / patch any finishes damaged by their abatement subcontractor's protections, tape, etc.

7. All staging area work as indicated on drawings SSP-001.00, SSP-002.00, SSP-100.00, SSP-110.00, SSP-120, SSP-130, SSP-140 (temporary sidewalk bridge, drives / walks, parking areas, for use by all trades, etc.) is by General Contractor, except temporary power.
8. General Contractor is responsible to provide negative air machines to ventilate all work areas during tasks involving odors, dust, fumes (epoxy floor, painting, etc.)
9. Exterior wall louvers for mechanical items shall be furnished and installed by General Contractor.
10. Excavation for concrete footings and bases for exterior lighting by General Contractor. New lighting and footings are by the Electrical Contractor.
11. Outdoor equipment pads is by General Contractor.
12. Within the existing basement all cutting of all interior slabs, excavation, utility trenching, bedding, warning tape, backfill and finishing shall be performed by the each Contractor. General Contractor shall provide final finish.
13. All exterior and interior excavation, **(except basement of the existing building)** utility trenching, bedding, warning tape, backfill, concrete pipe cover. and finishing shall be performed by the General Construction Contractor. Each M/E/P contractor is responsible for cleaning/flushing/purging, capping of piping etc. for abandoned utility(s).
14. Protection of trenches is by General Contractor.
15. All phasing work as indicated on phasing drawings PCHS-PH-1, PCHS-PH-2, PCHS-PH-3 and PCHS-PH-4

1.15 CONTRACT #2 - PLUMBING

A. Specification sections listed above as applicable to all contracts.

B. Work in the Plumbing Contractor Contract #2 includes, but is not limited to, the following:

DIVISION 03 - CONCRETE
- 03 3000 CAST-IN-PLACE CONCRETE

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
- 06 1000 ROUGH CARPENTRY

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
- 07 8400 FIRESTOPPING
- 07 9200 JOINT SEALANTS

DIVISION 22 – PLUMBING
- 22 0100 GENERAL CONDITIONS
- 22 0125 SCOPE OF WORK
- 22 0130 WATER SUPPLY SYSTEM
- 22 0160 SANITARY AND STORM DRAINAGE SYSTEMS
- 22 0180 NEW GAS SERVICE, STREET CONNECTIONS AND ASSOCIATED WORK
- 22 0200 MAGNETICALLY COUPLED PACKAGED GAS BOOSTER SYSTEM
- 22 0300 PLUMBING FIXTURES AND EQUIPMENT
- 22 0310 BACKFLOW PREVENTERS
- 22 0325 OIL SEPARATOR
- 22 0370 SPRINKLER SYSTEM
- 22 0420 SUPPORTS, SLEEVES AND PLATES
- 22 0430 INSULATION
- 22 0470 TESTS AND ADJUSTMENTS
- 22 0480 TAGS, CHARTS AND IDENTIFICATION
- 22 0490 GUARANTEE

DIVISION 31 - EARTHWORK

31 2301 EXCAVATION, BACKFILL AND COMPACTION

C. **Special Notes: Contract for - PLUMBING CONTRACTOR**

1. **New storm drainage chambers must be completed and functioning prior to any new storm drainage (Roofs, Parking Areas etc.) are connected to the new plastic drainage chambers. No new storm drainage shall be connected to the existing storm drainage system.**
2. Any wood blocking for Plumbing Contract, items by Plumbing Contractor.
3. All existing ceiling removal / replacements necessary to install new PC work will be by PC Contractor unless otherwise noted, Includes temporary supports for light fixtures, smoke detectors, etc.
4. Access doors furnished by trade requiring access; installation by General Contractor. in new walls, floor, ceiling, etc., Access door required in existing walls, floors, ceilings, etc., shall be furnished and installed by the contractor requiring access.
5. Interior (basement of existing building) excavation, utility trenching, bedding, warning tape, backfill and concrete slab replacement shall be performed by the Plumbing Contractor. Plumbing Contractor shall patch 1/8" below finish floor for General Contractor's final finishes. Plumbing Contractor is responsible for cleaning/flushing/purging, capping of piping etc. for abandoned utility(s).
6. Plumbing Contractor shall install an inflatable ball in all new plumbing fixtures to prevent construction debris or grout from entering sub-slab piping. Ball will be deflated / removed at the conclusion of the project as directed by the CM.
7. PC will install sealant around perimeter of all toilet / plumbing fixtures.
8. Plumbing Contractor shall install new pipe insulation which was removed under Contract #1 for General Construction, Asbestos Abatement. Refer to Asbestos Section and Drawings.
9. Interior house keeping pads for plumbing equipment by plumbing contractor.
10. Plumbing Contractor shall install pipe laboratory casework items provide by the General Contractor under Wood Laboratory Casework specifications Section 12-3553.

1.16 CONTRACT #3 - HVAC

A. Specification sections listed above as applicable to all contracts.

B. Work in the HVAC Contract #3 includes, but is not limited to, the following:

DIVISION 03 - CONCRETE
- 03 3000 CAST-IN-PLACE CONCRETE

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
- 06 1000 ROUGH CARPENTRY

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
- 07 8400 FIRESTOPPING
- 07 9200 JOINT SEALANTS

DIVISION 23 - HVAC
- 23 0100 GENERAL CONDITIONS
- 23 0110 SCOPE OF WORK
- 23 0120 BOILERS/BURNERS
- 23 0130 BOILER START-UP AND TESTING
- 23 0140 DOUBLE WALL INSULATE BOILER BREECHING SYSTEM
- 23 0190 PUMPS
- 23 0200 HYDRONIC SPECIALTIES
- 23 0225 FAN COIL UNITS
- 23 0235 ENERGY RECOVERY VENTILATOR
- 23 0240 CONDENSING UNITS

23 0250 PACKAGED ROOFTOP UNITS
23 0260 HEAT RECOVERY VARIABLE REFRIGERANT FLOW SYSTEM (HEAT PUMP)
23 0290 DUCT MOUNTED COILS
23 0300 FANS
23 0310 HOT WATER CABINET HEATERS
23 0320 HOT WATER UNIT HEATERS
23 0330 CONVECTORS
23 0340 FIN TUBE RADIATION
23 0400 SHEETMETAL WORK AND RELATED ACCESSORIES
23 0410 PIPING, FITTINGS, VALVES AND NOTES (HOT WATER)
23 0420 SUPPORTS, SLEEVES AND PLATES
23 0430 INSULATION AND COVERINGS
23 0440 DAMPERS AND MISCELLANEOUS
23 0460 AUTOMATIC TEMPERATURE CONTROLS
23 0470 TESTING, START-UP AND ADJUSTMENTS
23 0480 GENERAL LABELING, VALVE CHARTS AND PIPING IDENTIFICATION
23 0490 GUARANTEE

DIVISION 31 - EARTHWORK

31 2301 EXCAVATION, BACKFILL AND COMPACTION

C. **Special Notes: Contract #3 - HVAC CONTRACTOR**

1. **New storm drainage chambers must be completed and functioning prior to any new storm drainage (Roofs, Parking Areas etc.) are connected to the new plastic drainage chambers. No new storm drainage shall be connected to the existing storm drainage system.**
2. Any wood blocking for HVAC Contract items by HVAC Contractor.
3. All existing ceiling removal / replacements necessary to install new HVAC Contract work will be by HVAC Contractor unless otherwise noted. Includes temporary supports for light fixtures, smoke detectors, etc.
4. Interior housekeeping pads for HVAC equipment by HVAC Contractor.
5. Access doors furnished by trade requiring access; installation by General Contractor in new walls, floor, ceiling, etc., Access door required in existing walls, floors, ceilings, etc., shall be furnished and installed by the contractor requiring access.
6. Disconnects, Motor starters, etc. supplied by HVAC Contractor installed by Electrical Contractor, unless noted otherwise.
7. If new mechanical units are too large to fit through existing doorways the mechanical contractor will either disassemble equipment into sections, or remove masonry to enlarge opening and reconstruct to match (at no additional costs to Owner). MC shall notify Architect of proposed removals prior to removal. Architect / Engineer shall review for structural and other concerns. Removals shall not proceed without Architect / Engineer prior review and written approval. MC shall be responsible for all additional costs incurred by the Architect / Engineer review including structural analysis.
8. All new roof curbs to be supplied by HVAC Contractor (installed by General Contractor).
9. Any interior exhaust grilles or wall louvers for mechanical items are by HVAC Contractor including opening, lintels, caulking, etc.
10. Cutting of all interior slabs, excavation, utility trenching, bedding, warning tape, backfill, patching and finishing shall be performed by the each Contractor.
11. Interior (basement of existing building) excavation, utility trenching, bedding, warning tape, backfill and concrete slab replacement shall be performed by the HVAC. HVAC Contractor shall patch 1/8" below the finish for General Contractors final finishes. Contractor. The HVAC

Contractor is responsible for cleaning/flushing/purging, capping of piping etc. for abandoned utility(s).

1.17 CONTRACT #4 - ELECTRICAL CONTRACTOR

A. Specification sections listed above as applicable to all contracts

B. Work in the Electrical Contract includes, but is not limited to, the following:

DIVISION 03 - CONCRETE
- 03 3000 CAST-IN-PLACE CONCRETE

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
- 06 1000 ROUGH CARPENTRY

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
- 07 8400 FIRESTOPPING
- 07 9200 JOINT SEALANTS

DIVISION 26 - ELECTRICAL
- 26 0100 GENERAL CONDITIONS
- 26 0125 SCOPE OF WORK
- 26 0150 APPROVED MANUFACTURES
- 26 0200 CONDUIT
- 26 0250 DUCT BACK (ALTERNATE)
- 26 0275 15 KV MEDIUM VOLTAGE CABLE (ALTERNATE)
- 26 0300 WIRE AND CABLE
- 26 0320 OVERCURRENT PROTECTIVE DEVICES
- 26 0350 BOXES
- 26 0400 WIRING DEVICES
- 26 0450 CABINETS AND ENCLOSURES
- 26 0475 POWER CIRCUITS, TEMPORARY LIGHTING AND POWER
- 26 0500 SUPPORTING DEVICES
- 26 0550 GENERAL LABELING AND IDENTIFICATION
- 26 0575 INTERIOR LUMINARIES
- 26 0600 DISCONNECT SWITCHES
- 26 0650 GROUNDING
- 26 0700 PANELBOARDS
- 26 0725 DISTRIBUTION SWITCHBOARD (ALTERNATE)
- 26 0750 ELECTRIC SERVICE (ALTERNATE)
- 26 0775 SURGE PROTECTIVE DEVICE
- 26 0800 FIRE ALARM SYSTEM
- 26 0810 TELECOMMUNICATIONS AND AUDIO/VISUAL CABLING SYSTEM
- 26 0825 PUBLIC ADDRESSES SYSTEM
- 26 0820 AUDIO VISUAL
- 26 0850 WIRELESS CLOCK SYSTEM
- 26 0860 RESCUE ASSISTANCE SIGNAL SYSTEM - AUDIO/VISUAL
- 26 0900 GUARANTEE

DIVISION 31 - EARTHWORK
- 31 2301 EXCAVATION, BACKFILL AND COMPACTION

C. **Special notes: Contract #4 - ELECTRICAL CONTRACT**

1. **New storm drainage chambers must be completed and functioning prior to any new storm drainage (Roofs, Parking Areas etc.) are connected to the new plastic drainage chambers. No new storm drainage shall be connected to the existing storm drainage system.**
2. VFD's, disconnects, motor starters which are supplied by Mechanical Contractor will be installed by Electrical Contractor unless noted otherwise.
3. All existing ceiling removal / replacement necessary to install new electrical work to be by Electrical Contractor unless otherwise noted. Includes temporary supports for light fixtures, smoke detectors, etc.
4. Access doors furnished by trade requiring access; installation by for General Contractor. in new walls, floor, ceiling, etc., Access door required in existing walls, floors, ceilings, etc., shall be furnished and installed by the contractor requiring access.
5. Interior housekeeping pads for electrical equipment by Electrical Contractor.
6. Interior (basement of existing building) excavation, utility trenching, bedding, warning tape, backfill and concrete slab replacement shall be performed by the Electrical Contractor. The Electrical Contractor shall patch 1/8" below finish floor for General Contractor final finishes. The Electrical Contractor is responsible for cleaning, flushing, purging, capping of piping etc. for abandoned utility(s).
7. If the electrical switchgear panels are too large to fit through existing openings, electrical contractor will remove masonry to enlarge the opening and reconstruction to match (at no additional cost to Owner). EC shall notify Architect of proposed removals prior to removal. Architect / Engineer shall review for structural and other concerns. Removals shall not proceed without Architect / Engineer prior review and written approval. EC shall be responsible for all additional costs incurred by the Architect / Engineer review including structural analysis.
8. Any wood blocking or panel backboards for electrical items by Electrical Contractor.
9. Electric Contractor will tie up and secure with zip ties or J hooks, 5' oc, any existing cabling or wiring which sags below ceiling after any ceiling removals.
10. Temporary power as indicated on drawings SSP-001.00, SSP-002.00, SSP-100.00, SSP-110.00, SSP-120, SSP-130, SSP-140.
11. Any existing devices impacted by temporary partition installation (fire alarm strokes, bells, fixtures, devices, etc.) will be disconnected and reinstalled onto temporary partitions. When temporary partitions are removed then reinstall onto permanent surfaces.
12. Any solenoid valves will be supplied and installed by Plumbing Contractor. Electrical power wiring supply and install by Electrical Contractor.
13. Electrical Contractor shall firestop electrical back boxes, where required, in fire rate partitions as per detail.
14. All installation, wiring and connections, electrical devices for laboratory casework provided by the General Contractor shall be by the Electrical Contractor. Refer to Wood Laboratory Casework specifications Section 12-3553.
15. All work for Audio Visual shall be performed by the Electrical Contractor.
16. Concrete footing and bases for exterior lamp posts and bollards shall be by the Electrical Contractor.
17. Temporary electrical work as indicated on phasing drawings PCHS-PH-1, PCHS-PH-2, PCHS-PH-3 and PCHS-PH-4.

END OF SECTION

MILESTONE SCHEDULE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Milestone Construction schedule for project durations and phases, all contracts.

B. Related Sections include the following:
   1. Section 01 1000 - Summary of Contracts for work related to each Prime Contract.
   2. Section 01 3000 - Administrative Requirements for administrative requirements governing preparation and submittal of Prime Contractors' Construction Schedule.
   3. Section 01 3216 - Construction Progress Schedule governing preparation of Prime Contractors' Construction Schedule.
   4. Section 01 7800 - Closeout Submittals.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

B. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

C. Predecessor activity is an activity that must be completed before a given activity can be started.

D. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration.

E. Event: The starting or ending point of an activity.

F. Major Area: A story of construction, a separate building, or a similar significant construction element.

G. Milestone: A key or critical point in time for reference or measurement.

1.4 REGLATORY REQUIREMENTS

A. Comply with Section 01 3553 - Site Safety and Security Procedures including ID badge, safety vest, hard hat, etc. and all other required personal protective equipment as required by OSHA.
   1. Failure to abide by the aforementioned rules in paragraph (B) not limited to the Owner's requirements, and OSHA' safety rules and regulations, and without prior notice shall result in the removal of said individual from the site

1.5 MILESTONE SCHEDULE PREPARATION

A. A Master Schedule will be developed at a general meeting of all successful prime contractors within 10 days of Letter of Intent or Award of the Contracts. Each prime contractor will coordinate activities, forward submittals, deliver materials and provide necessary manpower to meet the milestones listed below.

1.6 REQUIREMENTS

A. By submitting his/her bid the contractor acknowledges and certify that the project will be completed by the Substantial Completion date and that his/her total base bid has been submitted in accordance with paragraph (A) in Section 5, below.

B. All contractors and their subcontractor's project superintendent, employees, directly or indirectly employed by the contractor to work on the project must at all times, whenever on the school property,

wear an ID badge, safety vest, hard hat, etc. and all other required personal protective equipment as required by OSHA.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

3.1 MILESTONE SCHEDULE

A. Building Hours: Refer to Section 01 1000 - Summary of Contracts.

B. Administrative Schedule

1.	Drawings out to Bid	Date January 21, 2019
2.	Pre-Bid Meeting	Date February 4, 2019
3.	Contractor's RFIs Due	Date February 21, 2019
4.	Bids Received	Date February 26, 2019
5.	Bidders Qualification Meetings	Date March 5, 2019
6.	Tentative Bid Award	Date March 18, 2019
7.	Contracts, Bonds and Insurance	10 days after Contract Award/Letter of Intent
8.	Construction Schedule - General Construction	10 days after Contract Award/Letter of Intent
9.	Construction Schedule Final	21 days after Contract Award /Letter of Intent

MILESTONE SCHEDULE

ADMINISTRATIVE - START DATE: March 18, 2019

1. Tasks: Schedule of Values, Progress Schedule, Contracts, Bonds and Insurance, Field verification of existing conditions, and Submittals.
2. Completion date: April 12, 2019.

PHASE 1 CONSTRUCTION:

1. Mobilization, Temporary Facilities, Parking, Partial Locker Room Level, Classroom Addition and Gymnasium Addition
2. Construction: Start Date March 18, 2019.
3. Completion Date:
   a. Classrooms- November 30, 2020.
   b. Gymnasium December 31, 2020.

PHASE 2 CONSTRUCTION

1. Tasks: Interior Renovations and Concrete Grandstand.
2. Construction: Start Date June 27, 2020
3. Completion Date: August 23, 2020

PHASE 3 FFE (Start date varies) FFE by Owner

PHASE 3A (For Phase 1 work).

1. Start Date:
   a. Classrooms- November 16, 2020.
   b. Gymnasium December 17, 2020.
2. Completion Date:
   a. Classrooms- November 30, 2020.
   b. Gymnasium December 30, 2020.

PHASE 3B (For Phase 2 work).

1. Start Date August 10, 2020
2. Completion Date: August 30, 2020

PHASE 4 - REMOVALS OF TEMPORARY CONSTRUCTION AREA, CLOSE- OUT.

1. PHASE 4A Punch List

a. Start Date: Two (2) weeks prior to the completion dates of Phase 1 and Phase 2
b. Completion Phase 4A:
    a) Classroom Addition Substaintial Completion November 16, 2020
    b) Gymnation Addition Substaintial Completion December 17, 2020
    c) Interior Renovations Substaintial Completion August 10, 2020
c. Removal of staging area.

2. PHASE 4B Closeout
    a. Start Date: After Substantial Completion
        a) Classroom Addition Novembeer 16, 2020
        b) Gymnasium Addition December 17, 2020
        c) Interior Renovations August 10, 2020
    b. Completion of Phase 4B:
        a) Classroom Addition December 21, 2020
        b) Gymnasium Addition January 18, 2021
        c) Interior Renovations September 14,, 2020

A. All work required by any of the Owner's representatives and consultants, including the Architect, Architect's consultants, Construction Manager, and Owner's Attorneys, etc etc., to execute final close-out of contract after 30 days beyond Milestone dates if determined to be caused by Contractor, shall result in payment(s) to the Owner's representatives and consultants, including the Architect, Architect's consultants, Construction Manager, and Owner's Attorneys, etc etc., in the form of a change order deduct to the base contract.

END OF SECTION

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Change procedures.

C. Procedures for preparation and submittal of application for final payment.

1.3 RELATED REQUIREMENTS

A. Section 00 5200 - Form of Agreement: Contract Sum, retainages, payment period, monetary values of unit prices.

B. Section 00 7200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

C. Section 01 2100 - Allowances: Payment procedures relating to allowances.

D. Section 01 2300 - Alternates: Payment procedures relating to alternates.

1.4 SCHEDULE OF VALUES

A. Form to be used: AIA G732/703.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample, in PDF format to Fuller and D'Angelo P.C. for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify bonds and sub-contractors.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

G. Provide a separate line item for the following: (where applicable)

1. Bonds. (Bond premium may be paid when invoice of premium is provided).
2. OCP. (Policy premium may be paid when invoice of premium is provided).
3. Labor and materials, when payment is anticipated for material not installed
4. Submittals. (1% Minimum of contract amount)
5. Each allowance.
6. Each alternate.
7. Meeting attendance. (2% Minimum of contract amount)
8. As-built Drawings. (2% Minimum of contract amount)
9. Testing: HVAC balance reports (5% Minimum of contract amount)
10. Testing: General Construction, Plumbing and Electrical (2% Minimum of contract amount.)
11. Punch List (1% Minimum of contract amount).
12. Final Cleaning
13. Closeout Documents (3% Minimum of contract amount)
14. Identify line items being performed by subcontractors.
15. Authorized change orders.

1.5 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G732 and Form AIA G703, edition stipulated in the Agreement.

C. Forms filled out by hand will not be accepted.

D. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Value.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

E. Execute certification by signature of authorized officer.

F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

H. Submit one (1) electronic "pencil copy", in PDF format, of each Application for Payment to Architect and Construction Manager for approval.

I. After Architect's approval of the "pencil copy" submit three hard copies to the Architect.

J. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 3000.
   2. Construction progress schedule, revised and current as specified in Section 01 3216.
   3. Partial Waivers of Mechanic's Lien: With each Application for Payment, submit partial waivers of mechanic's liens from contractor, subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
      a. Waiver Forms: Submit release of lien on forms, provided by the Architect 01 2005.
   4. When an application shows completion of an item, submit final or full waivers.
   5. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   6. Submit Final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   7. Certified Payrolls; All Applications for Payment must be accompanied with certified payrolls for all Contract Work performed. **In addition each contractor and sub-contractor shall submit to the Owner within thirty days after issuance of its first payroll, and every thirty days thereafter**, a transcript of the original payroll record subscribed and affirmed as true under penalties of perjury. The Owners 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.
      a. Submit certification that all personnel listed on certified payrolls have successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

K. Liens: No Payment will be made when a lien is filed against Owner by contractor or any subcontractor, or supplier or other entities until such lien is removed, bonded or similar action acceptable to the Owner

L. Project record documents as specified in Section 01 7800, shall be available for review by Port Chester-Rye UFSD as a prerequisite for approval of payment.

M. Affidavits attesting to off-site stored products and insurance certificates covering all site material and equipment.

N. Payments for stored materials (whether on-site but not installed, or stored in secured warehouse) will require a Bill of Lading showing the exact value. In no case will more than 90% be approved if the item is not installed. Insurance certificates will be provided specific to materials stored (for on or off site items)

O. When Architect and Construction Manager requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

P. The Architect and Owner shall retain Five (5) percent of the amount of each payment.

1.6 INITIAL APPLICATION FOR PAYMENT:

A. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Executed contract.
2. Approved bonds.
3. Approved insurance certificates.
4. Names of full time project manager, on site superintendent, and foreman. Refer to Article 11 of the General Provisions.
5. List of suppliers and fabricators: Refer to Section 01 1000 Summary of Contract(s) .
6. List of subcontractors: .
7. Approved Schedule of Values.
8. Contractor's Construction Schedule (preliminary if not final).
9. Contractor's Submittal Schedule.
10. Products list.

1.7 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Comply with Requirements of Section 01 7800 - Closeout Submittals.

1.8 MODIFICATION PROCEDURES

A. Refer to the General Provisions for additional information.

B. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

C. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Construction Manager will issue instructions directly to the Contractor.

D. The Contractor shall be responsible for informing other in it's employ, subcontractor's whose work is affected by any modifications.

E. For other required changes, Architect will issue a document signed by Port Chester-Rye UFSD instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.
3. Refer to the General Provisionsfor additional information.

F. Architect and Construction Manager may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change shall prepare and submit a fixed price quotation within ten (10) days.

G. Contractor may propose a change by submitting a request for change to Architect and Construction Manager, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 2500

H. Contractor may propose a change by submitting a request for change to Architect and Construction Manager, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 2500.

I. Contractor may propose a change by submitting a request for change to Architect and Construction Manager, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 2500

J. Contractor may propose a change by submitting a request for change to Architect and Construction Manager, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 2500

K. Computation of Change in Contract Amount: As specified in the Agreement and Provisions of the Contract.

L. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
      a. For Time and Material work Owner's representative shall verify time and material provided.

M. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

N. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

O. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

P. Promptly enter changes in Project Record Documents.

1.9 APPLICATIONS FOR PAYMENT WHEN BEHIND SCHEDULE

A. When the project falls behind schedule the contractor shall demonstrate the actions to be taken to put the project back on schedule.
   1. Payments will not approved until satisfactory evidence is presented to put the project on schedule.

1.10 APPLICATION FOR PAYMENT AFTER SCHEDULED COMPLETION DATE

A. In the event the work is not completed by the schedule date, listed in Section 01 1000 - Summary of Contracts, and in addition to the other remedies described, the Architect will not review progress payment requisitions submitted after the construction completion date, and the District will not issue any progress payments after that date, until all work is completed.

1. Only one requisition for work performed, after the construction completion date, may be submitted, and it may be submitted only when all work is complete and a Punch List inspection is conducted; said requisition may be submitted when the work at 100% complete, less 5% retainage.

1.11 APPLICATION FOR FINAL PAYMENT

A. Comply with Section 01 7800

B. It is understood by the Contractor that the maximum payment due the contractor prior to final payment shall be Ninety (95%) of the Contract amount and the final Five (5%) will be due only after the completion and submittal of all requirements of Section 01 7800 - Closeout Submittals are met, including completion of all “punch list” items..

C. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7800 - Closeout Submittals are submitted and approved.
   2. All "punch list" items have been completed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PARTIAL RELEASE OF LIEN

CONTRACTOR/SUBCONTRACTOR/VENDOR'S LETTERHEAD

Name of Facility: Port Chester High School

Address: 1 Tamarack Road, Port Chester, NY 10573

Name of Owner: Port Chester-Rye UFSD

Name of the Contractor/Subcontractor/Vendor: _____

Address: _____

Trade/Vendor:_____

Application # _____ Dated _____.

We certify that we have completed _____% of our Contract.

Prior to this requisition we have received payment equal to _____ % of of our contract amount.

The undersigned, upon receipt of the above requisition payment hereby releases and discharges the Owner of and from any liability or obligation in any way related to or arising out of this project up to and including the date of this document.

The undersigned further covenants and agrees that it shall not in any way claim or file a mechanic's or other lien against the premises of the above designated project, or any part thereof, or against any fund applicable thereto for any of the work, labor, materials heretofore furnished by it in connection with the improvement of said premises.

The undersigned further warrants that, in order to induce the Owner to release this partial payment, they have paid all claims for labor, material, .insurance, taxes, equipment, etc., employed in the prosecution of the work above, to date of this requisition.

The undersigned hereby releases and agrees to hold the Owner harmless from any and all claims in connection with the furnishing of such labor and materials, etc., for the construction of the aforementioned project.

The undersigned further guarantees that all portions of the work furnished .and/or provided by them are in accordance with the contract and that the terms of the contract with respect to these guarantees will hold for the period specified in said contract.

IN WITNESS WHEREOF, we have executed under seal this release on the above date and to be legally bound hereby:

WITNESS: _____FIRM: _____

BY: _____

_____

State of New York, County of _____ subscribed and sworn to before me this ____ day of _____ 201____

Notary public

My commission expires _____

END OF SECTION

ALLOWANCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. This Section includes administrative and procedural requirements governing allowances.
   1. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

C. Cash allowances.

D. Contingency allowance.

E. Inspecting and testing allowances.

F. Commissioning allowances.

1.3 RELATED REQUIREMENTS

A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

B. Section 01 6190 - Matrix of Building System Responsibility.

1.4 PAYMENTS FOR ALLOWANCES (Refer to General Conditions Article 3.8)

A. Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts.

B. 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.**

C. All costs, regardless if more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs and the allowances under paragraph 1.4.A and changes in Contractor's costs under paragraph 1.4.B., including the difference of costs included in the Contract sum.

D. Payment will not be made for any of the following:
   1. **Work performed prior to measurement and establishing quantities.**
   2. Products waste not used or disposed of off site.
   3. Products determined as unacceptable before or after placement.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

E. Allowance cost listed on the Bid Form are to be included in the Total Bid Proposal.

F. At closeout of Contract, funds remaining in Cash Allowance will be credited to Owner by Change Order.

1.5 CASH ALLOWANCES

A. Architect and Construction Manager Responsibilities:
   1. Consult with Owner's Representative, and Contractor for consideration and selection of products, suppliers, and installers.
   2. Select products in consultation with Port Chester-Rye UFSD and transmit decision to Contractor.

3. Prepare Change Order.

B. Contractor Responsibilities:
1. Assist Architect and Construction Manager in selection of products, suppliers, and installers.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

C. At closeout of Contract, funds remaining in Cash Allowance will be credited to Owner by Change Order.

1.6 CONTINGENCY ALLOWANCE

A. Refer to paragraph 1.4 above.

B. Quantities indicated are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

C. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
1. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Payment for Work governed by Contingency allowances will be made on the basis of the actual measurements and quantities of Work which is incorporated in or made necessary by the Work and accepted by the Construction Manager multiplied by the unit sum/price.

1.7 SCHEDULE OF ALLOWANCES

A. **CONTRACT #1 GENERAL CONTRACTOR**

1. **Cash Allowance** CA-GC-1: Include an allowance for use according to the Owner's instructions.
   a. Fifty Thousand _____($50,000.00) DOLLARS
   This amount is indicated on the bid form.

2. **Cash Allowance** CA-GC-2 Right of Way Survey.: Incude an allowance to survey and recover the base line, stake out the right of way and provide control points of the public roads adjoining the school site. This survey shall establish the "property line". Include two printed copies and an electronic flash drive.
   a. Five Thousand _____($5,000.00) DOLLARS
   This amount is indicated on the bid form.

3. **Contingency Allowance** Cont Allow -GC-1 Asbestos containing fittings
   Description: Removal of (25) asbestos containing fittings and installation of (25) new insulated fittings, up to 4" diameter.
   Unit of Measure: Each (including 6" each side of fitting).
   Quantity: 25.
   a. Twenty five fittings @_____ per fitting)
   _____ ($) DOLLARS

4. **Contingency Allowance** Cont Allow -GC-2 Asbestos containing pipe insulation
   Description: Removal of (150) linear feet of asbestos containing pipe insulation and installing new insulation..
   Unit of Measure: Linear Feet.
   Quantity: 150 linear feet.
   a. 150 Linear feet @_____ per linear foot)
   _____ ($) DOLLARS

5. **Contingency Allowance** Cont Allow -GC-3 Asbestos containing Floor Tile

Description: Removal of existing asbestos containing floor tile and mastic and installation of new VCT floor tile..
Unit of Measure: Square Feet.
Quantity: 100 square feet.
a. 100 square feet @_____ per square feet)
_____ ($) DOLLARS

6. **Contingency Allowance** Cont Allow -GC-4 Structural Fill
Description: Provide new compacted Structural Fill.
Unit of Measure: Cubic Yards.
Quantity: 100 cubic yards.
a. 100 cubic yards @_____ per cubic yard)
_____ ($) DOLLARS

7. **Contingency Allowance** Cont Allow -GC-5 Trench Rock Removal
Description: Remove trench rock off site. Refer to Section 31 2301 for definitions of rock.
Unit of Measure: Cubic Yards.
Quantity: 50 cubic yards.
a. 50 cubic yards @_____ per cubic yard)
_____ ($) DOLLARS

8. **Contingency Allowance** Cont Allow -GC-6 General Rock Removal
Description: Excavate general rock and remove off site. Refer to Section 31 2301 for definitions of rock.
Unit of Measure: Cubic Yards.
Quantity: 100 cubic yards.
a. 100 cubic yards @_____ per cubic yard)
_____ ($) DOLLARS

9. **Contingency Allowance** Cont Allow -GC-7 Drainage Fill
Description: Provide comapcted drainage fill. Refer to Section 31 2301 for classification of fill.
Unit of Measure: Cubic Yards.
Quantity: 10 cubic yards.
a. 10 cubic yards @_____ per cubic yard)
_____ ($) DOLLARS

10. **Contingency Allowance** Cont Allow -GC-8 Traffic Signs
Description: Provide on-site traffic signs as directed by the Owner. Refer to specifications, Section 32-1714
Unit of Measure: Each.
Quantity: Fifeteen (15).
a. Fifeteen (15) signs @_____ per sign)
_____ ($) DOLLARS

11. **Contingency Allowance** Cont Allow -GC-9 Relacement of Existing Gas Service
Description: Provide additional excavation, bedding, marker tape and backfill, etc. as required for the Plumbing Contractor to replace the existing gas service . Refer to drawings P206 and Contingency Allowance Cont Allow-PC-1
Unit of Measure: Linear Feet.
Quantity: One Hundred and Fifty (150).
a. One Hundred and Fifty (150) @_____ per linear feet)
_____ ($) DOLLARS

TOTAL CONTINGENCY ALLOWANCES CONTRACT #1 GENERAL CONSTRUCTION

_____
_____ ($) DOLLARS

(Sum of 1.6.A.2.a, 1.6.A.3.a, 1.6.A.4.a, 1.6.A.5.a, 1.6.A.6.a, 1.6.A.7.a, 1.6.A.8.a, 1.6.A.9.a, and 1.6.A.10.a. (to be inserted on bid form). **Section 01 2100 - Allowances to be submitted with bid.**

B. **CONTRACT #2 PLUMBING CONTRACTOR**

1. **Cash Allowance** PC-1: Include an allowance for use according to the Owner's instructions.
   a. Five Thousand_____($5,000.00) DOLLARS

   This amount is indicated on the bid form.
2. **Contingency Allowance** Cont Allow -P-1

   Description: Provide for the replace the existing gas service from the street valve at the property line to the owner's curb valve outside the boiler room per Con Ed requirements as shown on drawing P206.

   Unit of Measure: Linear Feet.

   Quantity: One Hundred and Fifty (150).
   a. One Hundred and Fifty (150) @_____ per linear feet)
   _____ ($) DOLLARS

TOTAL CONTINGENCY ALLOWANCES CONTRACT #2 PLUMBING CONTRACT
_____ ($) DOLLARS

C. **CONTRACT #3 HVAC CONTRACTOR**

1. **Cash Allowance** HV-1: Include an allowance for use according to the Owner's instructions.
   a. FifteenThousand_____($15,000.00) DOLLARS

   This amount is indicated on the bid form.

D. **CONTRACT #4 ELECTRICAL CONTRACTOR**

1. **Cash Allowance** EC-1: Include an allowance for use according to the Owner's instructions.
   a. Fifeteen Thousand _____($15,000.00) DOLLARS

   The amount is indicated on the bid form.
2. **Contingency Allowance** Cont Allow -E-1: Include an allowance for the costs associated with the Fire Alarm Programming. Refer to Section 01 6190 - Matrix of Building System Responsibility for requirements and quantities.
   a. Fifeteen Thousand _____($15,000.00) DOLLARS
3. **Contingency Allowance** Cont Allow -E-2: Include an allowance for the costs associated with the Security Camera System. Refer to 01 6190 - Matrix of Building System Responsibility c
   a. Forty Five Thousand _____($45,000.00) DOLLARS
4. **Contingency Allowance** Cont Allow -E-3: Include an allowance for the costs associated with the Door Access: 01 6190 - Matrix of Building System Responsibility for requirements and quantities.
   a. Twenty Five Thousand_____($25,000.00) DOLLARS

TOTAL CONTINGENCY ALLOWANCES CONTRACT #4 ELECTRICAL CONTRACT
Eighty Five Thousand _____ ($85,000.00) DOLLARS

(Sum of 1.6.D.2.a, 1.6.D.3.a, and 1.6.D.4.a to be inserted on bid form). Section 01 2100 - Allowances to be submitted with bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

ALTERNATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Description of alternates for selection by the Owner, not included in the Base Bid.

1.3 RELATED REQUIREMENTS

A. Document 00 2113 - Bidding Requirements: Instructions for preparation of pricing for Alternates.

B. Section 00 4100 Bid Form for listing amount of each alternate.

C. Document 00 5200 - Form of Agreement: Incorporating monetary value of accepted Alternates.

1.4 ACCEPTANCE OF Alternates

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Port Chester-Rye UFSD's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.5 SCHEDULE OF ALTERNATES - CONTRACT #1 GENERAL CONSTRUCTION

A. Alternate No. GC-1 Southwest Parking Area and Steps:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to to provide, furnish and install all labor, equipment and material to install work related to the provision of the western portion of the Southwest Parking Area, including associated concrete stair and related work in accordance with specifications and as shown on the contract drawings.

B. Alternate No. GC-2 - Exterior Concrete Grandstand Seating and Refurbishment:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to for the installation, removal and replacement of the existing grandstand seating, provision of new railings and the refurbishment of the existing concrete bleacher, painting and related work in accordance with specifications and as shown on the contract drawings

C. Alternate No. GC-3 North Parking Area:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to install work related to the provision of a new parking area and related items in accordance with the specifications and as shown on the contract drawings

D. Alternate No. -GC-4 Stairs I, J and K

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to rehabilitate the stairwells in accordance with specifications and as shown on the contract drawings.

E. Alternate No. - GC-5 Visiting Team and Weight Room:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to construct new Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building, in accordance with specifications and as shown on the contract drawings. The provision of the new elevator and related vestibules are base bid, per the document.

F. Alternate No. - GC-6 Existing Exercise/New Weight Room Skylights and Existing Stairwell:

1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to

replace existing skylights with new skylights and related work in the exisiting exercise/new weight room and exisiting stairwell in accordance with specifications and as shown on the contract drawings

G. Alternate No. GC-7 Urn Replacement:
   1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to provide one (1) exterior pre-cast concrete Urn and related work on the new Northeast plaza area, in accordance with specifications and as shown on the contract drawings.

H. Alternate No. GC-7A Urn Replacement:
   1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to provide three (3) additional exterior pre-cast concrete Urns and related work on the East side of the building, in accordance with specifications and as shown on the contract drawings.

I. Alternate No. GC-8 Interior Bleachers Seating:
   1. The Contractor for Contract #1 General Construction work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required for the new bleacher seating on the north side (Bank A) of the new Gymnasium, and related work in accordance with specifications and as shown on the contract drawings.

1.6 SCHEDULE OF ALTERNATES - CONTRACT #2 PLUMBING

A. Alternate No. P-1 Visiting Team and Weight Room:
   1. The Contractor for Contract #2 Plumbing work shall state the amount to be ADDED TO the Base Bid to provide , furnish and install all labor, equipment and material required to construct new Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building in accordance with specifications and as shown on the contract drawings. The new elevator and related vestibules are base bid.

1.7 SCHEDULE OF ALTERNATES - CONTRACT #3 HVAC

A. Alternate No. H-1 Visiting Team and Weight Room:
   1. The Contractor for Contract #3 HVAC work shall state the amount to be ADDED TO the Base Bid to provide, furnish and install all labor, equipment and material required to install work related to construct new Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building in accordance with specifications and as shown on the contract. drawings. The elevator and related vestibules are base bid.

1.8 SCHEDULE OF ALTERNATES - CONTRACT #4 ELECTRICAL

A. Alternate No. E-1 Southwest Parking Area Lighting:
   1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to provide , furnish and install all labor, equipment and material required for installation of pole lights and light bollards and related work at the Southwest parking area in accordance with specifications and as shown on the contract drawings.

B. Alternate No. E-2 North Parking Area Lighting
   1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid for the installation of pole lights and light bollards and related work at the North parking area in accordance with specifications and as shown on the contract drawings.

C. Alternate E-3 Visiting Team and Weight Room:
   1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to construct new Visiting Team Rooms and Weight Room and related work at the North East Wing of the HS building in accordance with specifications and as shown on the contract drawings. The new elevator and related vestibules are base bid.

D. Alternate Stair I, J and K

1. The Contractor for Contract #4 Electrical work shall state the amount to be ADDED TO the Base Bid to provide lighting and electrically associated work in the connecting stairwells in accordance with specifications and as shown on the contract drawings. (Drawings indicate work for Stair K. Work for stairs I and J shall be similar.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.3 RELATED REQUIREMENTS

A. Section 00 2113 - Bidding Requirements: Restrictions on timing of substitution requests and system substitutions.

B. Section 01 2100 - Allowances, for cash and contingency allowances affecting this section.

C. Section 01 2300 - Alternates, for product alternatives affecting this section.

D. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.

E. Section 01 6000 - Product Requirements: Fundamental product requirements, definitions for substitutions, product options, delivery, storage, and handling and restrictions on timing of substitution requests.

F. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.4 DEFINITIONS

A. Refer to Section 01 6000 - Product Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Port Chester-Rye UFSD.
5. Waives claims for additional costs or time extension that may subsequently become apparent.
6. Agrees to reimburse Architect and Construction Manager for review or redesign services associated with re-approval by authorities.
7. Statement indicating why specified material or product cannot be provided.
8. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
9. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
10. Samples, where applicable or requested.
11. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

12. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
13. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
14. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
15. Cost information, including a proposal of change, if any, in the Contract Sum.
16. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
17. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Contractor's Substitution Request documentation must include the following:
      a. Project Information:
         a) Official project name and number, and any additional required identifiers established in Contract Documents.
      b. Substitution Request Information:
         a) Discrete and consecutive Substitution Request number, and descriptive subject/title.
         b) Indication of whether the substitution is for cause or convenience.
         c) Issue date.
         d) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
         e) Description of Substitution.
         f) Reason why the specified item cannot be provided.
         g) Differences between proposed substitution and specified item.
         h) Description of how proposed substitution affects other parts of work.
      c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
         a) Physical characteristics.
         b) In-service performance.
         c) Expected durability.
         d) Visual effect.
         e) Sustainable design features.
         f) Warranties.
         g) Other salient features and requirements.
         h) Include, as appropriate or requested, the following types of documentation:
            (a) Product Data:
            (b) Samples: Provide full size actual sample of item proposed for substitution. Sample shall be provided, without exception, even if the originally specified item did not require a sample.
            (c) Certificates, test, reports or similar qualification data.
            (d) Drawings, when required to show impact on adjacent construction elements.

d. Impact of Substitution:
   a) Savings to Port Chester-Rye UFSD for accepting substitution.
   b) Change to Contract Time due to accepting substitution.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.
   2. Deliver sample to Architect.

3.2 SUBSTITUTION PROCEDURES AFTER AWARD OF CONTRACT

A. Submittal Form:
   1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Architect will consider requests for substitutions only within 30 days after date of Agreement.

C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

D. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to the Contract Documents.

3.3 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

3.4 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.5 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

3.6 ATTACHMENTS

A. A facsimile of the Substitution Request Form (During Construction) required to be used on the Project is included after this section.

SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST No. _____

(After the Bidding Phase)

Project: Additions, Alterations And Related Work

Substitution Request Number: _____

From: _____

Date: _____

A/E Project Number: 17295.03

Contract For: _____

Specification Title: _____Description: _____

Section:_____ Page:_____ Article/Paragraph: _____

Proposed Substitution:

Manufacturer: _____ Address: _____ Phone:_____
_____model no.: _____
Installer:_____ Address: _____ Phone: _____
History: _____New product _____2-5 years old _____ 5-10 yrs old _____ More than 10 years old
Differences between proposed substitution and specified product:
_____
Point-by-point comparative data attached - REQUIRED
Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____
Address:_____ Owner: _____
Date Installed: _____

Proposed substitution affects other parts of Work: ____ No ____Yes; explain
_____

Savings to Owner for accepting substitution: _____ ($)

Proposed substitution changes Contract Time: ____ No ____ Yes Add _____Deduct _____days.

Supporting Data Attached: ____ Drawings ____ Product Data ____ Samples _____ Tests Reports

The Undersigned certifies:

Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

Same warranty will be furnished for proposed substitution as for specified product.

Same maintenance service and source of replacement parts, as applicable, is available.

Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.

Proposed substitution does not affect dimensions and functional clearances.

Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Local support and availability will be available for proposed substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments:_____

A/E's REVIEW AND ACTION

____ Substitution approved - Make submittals in accordance with Specification Section 01330

____ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.

____ Substitution rejected - Use specified materials.

____ Substitution Request received too late - Use specified materials.

____ Additional information requested.

By:_____Date:_____

Additional Comments: __ Contractor __ Subcontractor __ Supplier __ Manufacturer __ A/E

_____

_____

_____

_____

_____

END OF SECTION

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Progress meetings.

E. Contractor's daily reports.

F. Submittals for review and information.

G. Number of copies of submittals.

H. Requests for Interpretation (RFI) procedures.

I. Submittal procedures.

1.3 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions: Duties of the Construction Manager.

B. Section 01 1000 - Summary of Contracts: Sequence of Work, Work covered by each contract occupancy, .

C. Section 01 3216 - Construction Progress Schedule: Form, content, and administration of schedules.

D. Section 01 6000 - Product Requirements: General product requirements.

E. Section 01 3553 - Site Safety and Security Procedures.

F. Section 01 5000 - Temporary Facilities and Controls.

G. Section 01 7000 - Execution: Additional coordination requirements.

H. Section 01 7800 - Closeout Submittals.

I. Section 01 9100 - Commissioning Requirements: Additional procedures for submittals relating to commissioning.

1. Where submittals are indicated for review by both Architect, Construction Manager, and Commissioning Authority submit one extra and route to Architect and Construction Manager first, be for forwarding to the Owner's Representative and Commissioning Authority.
2. Where submittals are not indicated to be reviewed by Architect, submit directly to the Construction Manager and Commissioning Authority; otherwise, the procedures specified in this section apply to commissioning submittals.

1.4 REFERENCE STANDARDS

A. Submittal Cover Sheet: Attached at the end of this section.

1.5 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect and Construction Manager:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.

5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

1.6 PROJECT COORDINATION

A. Owner's Representative: Construction Manager: School Construction Consultants.
   1. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. Prepare similar memoranda for the Architect and Construction Manager and separate contractors where coordination of their work is required.

B. Each Contractor shall:
   1. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
      a. Preparation of schedules.
      b. Installation and removal of temporary facilities.
      c. Processing of submittals and photocopying/delivery to affected contractors.
      d. Progress meetings.
      e. Project closeout activities.
   2. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.
   3. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.
   4. Coordination: Each contractor shall coordinate its construction operations with those of other Contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
      a. Coordinate installation of different components with other contractors and/or subcontractors to ensure maximum accessibility for required maintenance, service, and repair
   5. Each shall cooperate with the Construction Manager in allocation of mobilization areas of site, access, traffic, parking facilities, field offices, and sheds.
   6. During construction, coordinate use of site and facilities through the Project Coordinator.
   7. Comply with Construction Manager's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
   8. Comply with instructions of the Construction Manager's for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary of Contracts.
   9. Coordinate field engineering and layout work under instructions of the Construction Manager.

C. Make the following types of submittals to Architect and Construction Manager

1. Requests for Interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Each Contractor and Architect and Construction Manager are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Construction Manager and Architect's consultants will be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Submittal Service: The selected service is:
   1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.

C. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Construction Manager and Architect and Contractor participating; further training is the responsibility of the user of the service.

D. Project Closeout: Architect and Construction Manager will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Port Chester-Rye UFSD.

3.2 PRECONSTRUCTION MEETING

A. Construction Manager will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Port Chester-Rye UFSD.
   2. Fuller and D'Angelo P.C.
   3. Consultants.

4. Construction Manager
5. All contractors.
6. Contractor's Field Superintendent.

C. Agenda:
1. Execution of Port Chester-Rye UFSD-Contractor Agreement.
2. Submission of executed Bonds and Insurance certificates..
3. Distribution of Contract Documents.
4. Submission of schedule of values, progress schedule, list of products,, and list of subcontractors,
5. Designation of personnel representing the parties to Contract.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Review construction scheduling.
8. Use of premises by Owner and Construction Manager and Prime Contractors.
9. Port Chester-Rye UFSD's requirements and occupancy prior to completion.
10. Construction facilities and controls provided by Port Chester-Rye UFSD.
11. Temporary utilities provided by Port Chester-Rye UFSD.
12. Survey existing facilities prior to staring construction.
13. Security and housekeeping procedures.

D. Construction Manager will record minutes and distribute copies within five days after meeting to all participants. Contactor shall distribute to all entities of the Contractor affected by decisions made.

3.3 PROGRESS MEETINGS

A. Construction Manager will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Meetings will be scheduled throughout progress of the Work at minimum of two week intervals.

C. Attendance Required:
1. Port Chester-Rye UFSD.
2. Fuller and D'Angelo P.C.
3. Construction Manager
4. Contractors.
5. Special consultants.
6. Contractor's superintendent.
7. Major Subcontractors.
8. Suppliers as appropriate to agenda topics for each meeting.

D. Attendees: In addition to representatives of the Owner, Architect/Engineer, and Construction Manager, each Prime Contractor shall be represented at these meetings.
1. Attendance is mandatory at each meeting and a penalty sum of $500.00 per missed meeting will be assessed to the Prime Contractor not attending without prior written authorization from the Construction Manager. Subcontractors, suppliers, or other entities will be invited at the discretion of the Construction Manager and Architect. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the work
2. Subcontractors, suppliers, or other entities will be invited at the discretion of the Construction Manager.
3. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work

E. Agenda:
1. Review minutes of previous meetings.

2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of delivery schedules.
7. Review construction safety programs.
8. Review exiting and separation of construction
9. Maintenance of progress schedule.
10. Corrective measures to regain projected schedules.
11. Planned progress during succeeding work period.
12. Coordination of projected progress.
13. Maintenance of quality and work standards.
14. Effect of proposed changes on progress schedule and coordination.
15. Other business relating to work.

F. Construction Manager will record minutes and distribute copies within five days after meeting to all participants. Contactor shall distribute to all entities of the Contractor affected by decisions made.

3.4 WEEKLY COORDIATION MEETINGS

A. The Construction Manager shall schedule and hold weekly general project coordination meetings at regularly scheduled times that are convenient for the attendance of prime contractors and other parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Required attendance includes General Construction Contractor, HVAC Contractor, Plumbing Contractor, and Electrical Contractor and every other entity identified by any prime contractor as being currently involved the coordination or planning for the work of the entire project. Conduct meetings in a manner that resolve coordination problems. The Contractor for General Construction Contractor shall preside at each meeting, and shall record meeting results. The General Construction Contractor shall distribute copies of the meeting result to everyone in attendance, the Architect and Construction Manager and to others affected by the decisions and actions resulting from each meeting.

1. Each Contractor review with the Construction Manager the work schedule for the week in order to insure the planned work does not conflict with facility operations.

3.5 CONSTRUCTION PROGRESS SCHEDULE - See Section 01 3216

3.6 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Transmit reports electronically Architect and Construction Manager at weekly intervals.

C. Each Contractor shall prepare a daily construction report recording the following information concerning events at Project site and project progress:

1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. Major equipment at Project site.
5. Material deliveries.
6. Safety, environmental, or industrial relations incidents.
7. Meetings and significant decisions.
8. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain

differences, if any. Note days or periods when no work was in progress and explain the reasons why.

9. Testing and/or inspections performed.
10. Signature of Contractor's authorized representative.

3.7 COORDINATION AND COORDINATION DRAWINGS

A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

B. All primes shall provide information required by other primes for preparation of coordination drawings required by a prime contractor.
   1. All roofing work must be performed by roofing sub-contractors approved by the roofing manufacturer in insure roofing warranty is maintained.

C. Provide information required by Architect and Construction Manager for preparation of coordination drawings including:
   1. Review drawings prior to submission to Architect and Construction Manager .
   2. Indicate all HVAC equipment, ductwork, and major piping, including elevations and dimensions to all fixed building elements, such as beams; columns; slabs; ceilings, including ceiling suspension; framing; floors; walls; doors, including door swings; and windows affected by the equipment, ductwork, and piping.
   3. Indicate all existing and proposed lighting fixtures, smoke detectors, and sprinkler heads.
   4. Show location of all valves, dampers (fire, smoke, volume, and automatic), coils, humidifiers, smoke detectors, etc. requiring access for service and maintenance.
   5. Show all registers, grilles, diffusers, radiators and convectors, and other terminal elements.
   6. Locate all access doors.
   7. Include large-scale details and sections as required to fully delineate the conditions in congested areas, leaving space for the work of the other trades.
   8. Show plan layout of all equipment and anchoage and fasteners

3.8 SPECIAL COORDINATION DRAWINGS

A. Procedures for special coordination drawings shall be in accordance with paragraphs below:
   1. The Construction Contractor shall furnish sufficient experienced drafting and engineering personnel to prepare coordination drawings and participate in coordination meetings scheduled and directed by the Owner's Representative. The Construction Contractor Contractor shall submit the coordination drawings of their trades within 15days from the date of the Letter of Award. Each of the other Contractors shall prepare their coordination drawings within ten days of receiving the coordination drawing "Set" from the previous contractor.
   2. Coordination drawings shall be completed and submitted for distribution in time so as not to delay the construction. The coordination drawings may lack complete data in certain instances pending receipt of shop drawings, but sufficient space shall be allotted for the items affected.
   3. The Construction Contractor shall initiate coordinating the installations for all the Contractors by means of coordination and sleeve drawings, as specified herein.
      a. The Construction Contractor shall prepare CADD drawing on CD indicating their equipment and appurtenances for each floor and phase, at not less than 3/8" scale. The drawings shall show beams, columns, ceiling grid and heights, walls/partitions, casework, floor to floor dimensions, floors, windows, door swings etc. that relates to the construction.
      b. The Construction Contractor shall deliver CADD drawing on CD to HVAC Contractor, with copy of transmittal to Architect and Construction Manager .
   4. The HVAC Contractor shall overlay on CADD drawing on CD, at a scale of 3/8" = 1'-0" showing all HVAC equipment, ductwork, and major piping, including elevations and dimensions to all

fixed building elements, such as beams; columns; slabs; ceilings, including ceiling suspension; framing; floors; walls; doors, including door swings; and windows affected by the equipment, ductwork, and piping. Show all registers, grilles, diffusers, radiators and convectors, and other terminal elements Show location of all valves, dampers (fire, smoke, volume, and automatic), coils, humidifiers, smoke detectors, etc. requiring access for service and maintenance. Locate all access doors. Include large-scale details and sections as required to fully delineate the conditions in congested areas, leaving space for the work of the other contractors. Show plan layout of all equipment bases, pads, and inertia blocks. Clearly label all work by HVAC Contractor.

a. HVAC Contractor shall deliver CADD drawings on CD to Plumbing Contractor, with copy of transmittal to Architect and Construction Manager. The Construction Contractor shall verify elevations and dimensions to all fixed building elements, such as beams; columns; slabs; ceilings, including ceiling suspension; framing; floors; walls; doors, including door swings; and windows

5. The Plumbing Contractor shall overlay on the mylar transparency coordination drawings prepared by the HVAC Contractor all water supply, drain, waste, vent, sprinkler main and branch piping, risers and sprinkler heads and other major lines. Indicate piping elevations and locations of fire hose cabinets, drinking fountains, etc. which encroach on duct shafts. Locate valves and other items requiring access for service and maintenance. Locate all access doors. Avoid interference with HVAC work and with building construction. Use same scale as drawing being overlaid. Clearly label all work by Plumbing Contractor.

   a. Plumbing Contractor shall deliver mylar transparencies to Electrical Contractor with copy of transmittal to Architect and Construction Manager.

6. The Electrical Contractor shall overlay on CADD drawings on CD coordination drawings prepared by Construction and HVAC Contractors all main conduit and bus runs, cable trays, light fixtures, major equipment, and switch gear and panel boards. Show elevations and clearances. Show all items requiring access for service and maintenance. Locate all access doors. Avoid interference with HVAC work and with building construction. Use same scale as drawings being overlaid. Clearly label all work by Electrical Contractor

   a. Electrical Contractor shall deliver CADD drawings on CD to Construction Contractor with copy of transmittal to Architect and Construction Manager.

7. The Construction Contractor shall review and verify all beams, columns, ceiling grid and heights, walls/partitions, casework, floor to floor dimensions, floors, windows, door swings etc. that relates to the construction.

8. Each Contractor shall attend coordination meetings and participate as directed by Construction Manager to resolve interference and conflicts. All such coordination work is included in the contract responsibility of each involved contractor. When mutually agreed, make minor changes in ductwork, piping, or conduit routing or equipment location required to avoid space conflicts, but do not resize items or relocate exposed items without the Architect or Construction Manager's approval. Do not make changes in wall or chase locations, ceiling heights, door swings or locations, window or other openings, or other items affecting the function or aesthetic effect of the building. If conflicts or interference cannot be satisfactorily resolved with such minor changes, notify the Owner's Representative who shall obtain a decision from the Architect.

9. Each Contractor shall prepare coordination drawings without awaiting final product approval of terminal devices, outlets, fixtures, etc. Provide sufficient space for such items and re-coordinate as required when final product approval is obtained.

10. No preference or advantage shall be given to any contractor in considering solution of conflicts, or grant priority to any one contractor in the allocation of space. If the contractors are unable to reach an agreement on a matter on a matter of interference the matter shall be submitted to the Architect for his binding decision. Should any problems of coordination require architectural or structural changes of design, this change shall be submitted to the Architect for approval.

11. After the set has been coordinated and all necessary changes have been made, these drawings shall then by signed off by each of the contractors, indicating their awareness of and agreement with the

indicated routings and layouts and their inter-relationship with the adjoining or contiguous work of all contracts Thereafter, no unauthorized deviations will be permitted and if made without the knowledge or agreement of the Architect and Owner's Representative or other affected contractors, will be subject to removal and correction at no additional cost to the Owner.

12. After final coordination and sleeve drawings have been agreed upon and signed by all contractors. The Construction Contractor shall provide and distribute copy in PDF format to each of the Prime Contractors, the Architect and Construction Manager for reference and record purposes. Contractors desiring additional copies of such drawings, beyond the basic distribution indicated above shall arrange and pay for cost of same.

B. Each contractor as a working reference shall retain the record copies of final coordination drawings. All shop drawings, prior to their submittal to the Architect shall be compared with the coordination drawings and developed accordingly by the contractor responsible. Any revisions to the coordination drawings, which may become necessary during the progress of the work shall be noted by all Contractors and shall be neatly and accurately recorded on the record copies. Each Contractor shall be responsible for the up-to-date maintenance of their own record copies of the coordination drawings and keep one copy available at the site. Each Contractor and sub Contractors in the development of their “as-built” drawings thereto, shall utilize the coordination drawings and any subsequent changes. The Contractor(s) may not use coordination drawings for the submittal of ductwork.

C. NO EXTRA COMPENSATION will be paid to any contractor for relocating any duct, pipe, conduit, or other material installed without coordination among trades involved or among other affected contractors. Each Contractor who causes any additional work to other contractors by improperly coordinated work or work not installed in accordance with the signed coordination drawings shall reimburse the affected other contractors for the cost of the additional work.

D. All changes in the work on any contract, whether a change in price is given or not, shall be shown on the coordination drawings.

E. Coordination drawings shall not be used for “shop drawings” or "as-built" drawings except where approved by the Owner's Representative.

F. Upon completion of the project, the Construction Contractor shall turn over the original reproducible coordination drawings, plus 4 blue-line copies to the Owner's Representative.

3.9 REQUESTS FOR INTERPRETATION (RFI)

A. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
   2. Prepare using software provided by the Electronic Document Submittal Service.

B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section-01 2500 - Substitution Procedures)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response.

C. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.

D. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Port Chester-Rye UFSD.

3.10 SUBMITTAL SCHEDULE

A. Submit to Architect and Construction Manager for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule.
2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.

3.11 SUBMITTALS FOR REVIEW

A. Refer to paragraph 3.1 for addition requirements and procedures.

B. All submittals are the product and the property of the Contractor. The Owner, Owner's Representative , Architect, Construction Manager, or Consultants shall not be responsible for the contractor's construction means, methods or techniques: safety precautions or programs; Acts or admissions; or failure to carry out the work in accordance to the contract documents

C. Shop Drawing Submittal Log no later than five (5) working days after award of contract.

D. All Shop Drawing Submittals shall be submitted no later than forty (40) calendar days after Letter of Award of Contract. No further payments will be made to the contractor after forty (40) until all submittals are made.

E. When the following are specified in individual sections, including but not limited to the following, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.
5. Templates.
6. Standard wiring diagrams.

F. Submit to Architect and Construction Manager for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

G. Samples will be reviewed only for aesthetic, color, or finish selection and for record documents purposes described in Section 01 7800 - Closeout Submittals.

H. After review, provide copies and distribute in accordance with Submittal Procedures article below .

I. The Architect shall review and approve or take other appropriate action on the Contractor submittals, such as shop drawings, product data, samples and other data, which the Contractor is required to submit, but only for the limited purpose of checking for conformance with the design concept and the information shown in the Construction Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect's review shall be conducted with reasonable promptness while allowing sufficient time in the Architect's judgment to permit adequate review. Review of a specific item shall not indicate that the Architect has reviewed the entire assembly of which the item is a component. **The Architect shall not be responsible for any deviations**

from the Construction Documents not brought to the attention of the Architect, in writing, by the Contractor. The Architect shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

J. Marking or comments on shop drawings shall not be construed as relieving the Contractor from compliance with the contract project plans and specifications, nor departure therefrom. The contractor remains responsible for details and accuracy for conforming and correlating all quantities, verifying all dimensions, for selecting fabrication processes, for techniques of assembly and for performing their work satisfactorily and in a safe manner.

K. **Architect will review the original submittal and one (1) re submittal. Additional reviews will be additional services provided to the Owner and charged accordingly. The Owner will back charge the contractor accordingly.**

L. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

M. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

3.12 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Inspection reports.
4. Manufacturer's instructions.
5. Manufacturer's field reports.
6. Other types indicated.

B. Submit for Construction Manager's knowledge as contract administrator. No action will be taken.

3.13 SUBMITTALS FOR PROJECT CLOSEOUT

A. Refer to Section 01 7800 - Closeout Submittals..

3.14 NUMBER OF COPIES OF SUBMITTALS

A. Documents: Submit one electronic copy **in PDF format**; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected. All submittals shall be in electronic format and conforming to the following:
1. Each item shall be in a separate file.
2. Each file name shall start with the specification section number and contain an abbreviated explanation of what it contains; for example:
a. 08 5113 Aluminum Windows; 08 1613 Fiberglass Doors and Aluminum Frames; 08 8000 Glazing.
3. Add Revision number (Rev2 Rev3, etc) to the file name when resubmitting items, for example:
a. 07 5323 EPDM Rev l.pdf 07 5323 Bond AdhRev l.pdf
4. Provide a Cover Sheet with each item - in the same file as the technical submittal.
5. Do not zip the files, and do not put the files in Folders.
6. Make all technical submittals at one time per trade- refer to the specification for additional submittal requirements for example:
a. Concrete; Masonry; Miscellaneous Fabrications; Roofing; etc.
7. Do not send MSDS with the technical submittals; collate all of the MSDS needed for the entire project in three ring binders, organized by specification section, and submit the binders to the Construction Manager, with copy of Transmittal to the Architect, and maintain one copy at the project site.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Construction Manager.
   1. After review, produce duplicates.
   2. Approved sample will be retained at the project site.
   3. Retained samples will not be returned to Contractor unless specifically so stated.
   4. Submit with each sample, in electronic PDF format, data, cuts, photos, color, charts, etc.

3.15 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Refer to paragraph 3.1 for additional requirements.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Transmit using approved form attached to this section.
   4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
      b. All submitted shop drawings shall be stamped and signed by the Contractor with the following note:
         a) "We the undersigned certify that we have reviewed and coordinated this shop drawing and they are in conformance to the plans, specifications, applicable codes and other provisions of the Contract Documents."
   7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Send submittals in electronic format via email to Architect and Construction Manager.
   8. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 10 working days excluding delivery time to and from the Contractor.
      b. For sequential reviews involving Architect and Construction Manager or another affected party, allow an additional 7 days.
   9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   10. Provide space for Contractor and Architect and Construction Manager review stamps.
   11. When revised for resubmission, identify all changes made since previous submission.
   12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
   13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   14. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
2. Do not reproduce the Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.16 SUBMITTAL REVIEW

A. Submittals for Review: Architect and Construction Manager will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect and Construction Manager will acknowledge receipt, but will take no other action.

C. Architect and Construction Manager's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and his consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
a. "Approved", or language with same legal meaning.
b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
2. Not Authorizing fabrication, delivery, and installation:
a. "Revise and Resubmit".
a) Resubmit revised item, with review notations acknowledged and incorporated.
b. "Rejected".
a) Submit item complying with requirements of Contract Documents.

E. Architect's and his consultants' actions on items submitted for information:
1. Items for which no action was taken:
a. "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
a. "Reviewed" - no further action is required from Contractor.

3.17 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. General: Except for submittals for the record and similar purposes, where action and return on submittals is required or requested, the Architect/Engineer will review each submittal, mark with appropriate "Action".

C. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

D. Final Unrestricted Release: Where the submittals are marked as follows, the work covered by the submittal may proceed provided it complies with the requirements of the contract documents; acceptance of the work will depend upon that compliance.
1. Marking: "No Exceptions Taken"

E. Final-But-Restricted Release: When the submittals are marked as follows, the work covered by the submittal may proceed provided it complies with both the Architect's/Engineer's notations or corrections

on the submittal and with the requirements of the contract documents; acceptance of the work will depend on that compliance.

1. Markings: "Make Correction Noted"

F. Returned for Re-submittal: When the submittal is marked as follows, do not proceed with the work covered by the submittal, including purchasing fabrication, delivery or other activity. Revise the submittal or prepare a new submittal in accordance with the Architect's/Engineer's notations stating the reasons for returning the submittal; resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with the following marking to be used at the project site, or elsewhere where work is in progress.

1. Marking: "Revise and Resubmit"

G. Marking: "Rejected".

H. Other Action: Where the submittal is returned, marked with the Architect/Engineer's explanation, for special processing or other Contractor activity, or is primarily for information or record purposes, the submittal will not be marked.

SUBMITTAL COVERSHEET

Port Chester-Rye UFSD

Additions, Alterations And Related Work

Port Chester High School

ARCHITECT:	**CONSTRUCTION MANAGER:**	**OWNER:**
Fuller and D'Angelo P.C.	**School Construction Consultants**	**Port Chester-Rye UFSD**
45 Knollwood Rd.	**190 Motor Parkway Suite 201**	**113 Bowman Avenue.**
Elmsford, NY10523	**Hauppauge, New York 11788**	**Port Chester, New York 10753**

CONTRACTOR: _____ CONTRACT: _____

ADDRESS: _____

DATE _____TELEPHONE: _____EMAIL: _____

Facility Name: Port Chester High School

Type of Submittal: Re-submittal: [ ] No [ ] Yes

[ ] Shop Drawings [ ] Product Data [ ] Schedule [ ] Sample

[ ] Test Report [ ] Certificate [ ] Color Sample [ ] Warranty

SUBMITTAL DESCRIPTION: _____

PRODUCT NAME: _____

MANUFACTURER: _____

SUBCONTRACTOR/_____

SUPPLIER: _____

SPEC. SECTION NO.: _____ DRAWING NO(S): _____

PARAGRAPH: _____ RM. OR DETAIL NO(S): _____

CONTRACTOR'S REVIEW STAMP

Contractor Review Statement: These documents have been checked for accuracy and coordinated with job conditions and Contract requirements by this office and have been found to comply with the provisions of the Contract documents.

Remarks:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

NAME: _____ DATE: _____

END OF SECTION

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

C. Master Schedule.

1.3 RELATED SECTIONS

A. Section 01 1000 - Summary of Contracts: Work sequence.

B. Section 01 1010 - Milestone Schedule.

C. Section 01 3000 - Administrative Requirements.

D. Reference drawing - Site Safety Plan.

E. Phasing Drawing.

1.4 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

1.5 RESPONSIBILITY

A. The General Construction Contractor Contract #1 shall, within 30 days after contract award, be responsible for preparing and updating a **master progress schedule for all contracts.**

1. Each Contractor shall develop a full schedule, in sufficient detail and clarity of form and technique so that the General Construction Contractor can plan and control his work properly and the Construction Manager can readily monitor and follow the progress for all portions of the work. Each Contractorr shall complete the detailed schedule within 10 days after Letter of Award.
   a. Identify all long lead items and dates required on site.
   b. In the event of conflict Construction Manager shall resolve and provide direction which is in the best interest on the District.
2. Each Contractor shall coordinate their work with work of all prime contractors.
3. The General Construction Contractor shall prepare a **draft master schedule** within 10 days after receiving schedules from each prime contractor and distribute to all prime contactors, Architect and Construction Manager
4. Within 5 days after receiving draft master schedule all prime contractors shall meet to revise, (if required) and sign off on the master schedule.
   a. In the event of conflicts the Construction Manager shall resolve and provide direction which is in the best interest on the District.
5. The General Construction Contractor Contract #1 shall be responsible for incorporating all final revision, schedules, of all prime contractors, and prepare a **full final master schedule,** and updates, as required or directed by the Construction Manager.

B. General Construction Contractor Contract #1 shall coordinate their work with work of all prime contracts.

C. The activities identified in the schedule shall be analyzed in detail to determine activity time durations in units of whole working days. All duration's shall be the result of definitive manpower and resource planning by the Contractor.

D. The activity data shall include activity codes to facilitate selection, sorting and preparation of summary reports and graphics. Activity codes shall be developed for:

1. Area: Subdivision of the building(s) and/or site(s) into logical modules or blocks and levels. Pods A, B, C and D, etc.
2. Contractor or subcontractor responsible for the work.
3. Specifications: 16 Division CSI format.
4. System: Division of the work into building systems for summary purposes.
5. Milestone: Work associated with completion of interim completion dates or milestones
6. Pay Item: Work identified with a pay item on the Schedule of Values.

1.6 SUBMITTALS

A. Within 10 days after date Letter of Award, each prime Contractor shall submit preliminary schedule to the General Construction Contractor with copies to the Construction Manager.

B. Within ten (10) days after receipt of each preliminary schedule, the General Construction Contractor shall develope the Master Schedule and distribute to each prime contractor.

C. If preliminary Master Schedule requires revision after review, submit revised schedule within 5 days with copies to the Construction Manager.

D. Within 5 days after review of Master Schedule, submit final of the complete schedule for approval.
   1. Include written certification that all prime Contractors have reviewed and accepted proposed schedule.

E. Submit updated master schedule with each Application for Payment.

F. When requested by the Construction Manager submit when project fall behind schedule.

G. Submit under transmittal letter form specified in Section 01 3000 - Administrative Requirements.

H. The Contractor(s) are hereby notified that payment requisitions will not be processed by the Architect and Construction Manager, nor paid by the Owner, until all schedules are reviewed, updated and approved by each prime contractor Architect and Construction Manager and Master Schedule revised.

1.7 QUALITY ASSURANCE

A. Scheduler: Contractor 's personnel or specialist Consultant specializing in construction scheduling with three (3) years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

B. Contractor's Administrative Personnel: 3 years minimum experience in using and monitoring Bar Chart schedules on comparable projects.

1.8 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each building and each activity. Identify each activity with the applicable specification section number.

B. Submit schedule in electronic PDF format.

C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

B. Based on the preliminary development of the progress schedule and on feedback from Architect and Construction Manager or whatever updating may have occurred during the project start-up, the General Construction Contractor shall, for the entire work of of all the prime contracts, , prepare the (Master Schedule), secure critical time commitments for performing major elements of all the work.

3.2 GENERAL CONTENT.

A. Milestones: Include milestones in schedule, including, but not limited to, Notice of Award, Submittals, Verification of existing conditions, Asbestos/Lead Abatement, Removals, Delivery of Major Equiment, such as HVAC Units, Fans, Motors, Installation, Substantial Completion, Completion of Punch List, Final Completion, and Closeout

B. Show complete sequence of construction by phase, activity, by room with dates for beginning and completion of each element of construction.

C. Identify each item by specification section number.

D. Identify work of Addition and other logically grouped activities.

E. Provide sub-schedules for each stage of Work identified in Section 01 1000 - Summary of Contracts.

F. Include conferences and meetings in schedule.

G. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Architect and Construction Manager. Indicate decision dates for selection of finishes.

I. Indicate delivery dates for products identified under Allowances and products identified under Alternates.

J. Provide legend for symbols and abbreviations used.

3.3 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 15 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Port Chester-Rye UFSD and to Port Chester-Rye UFSD's benefit.
   11. Percentage of activity completed.
   12. Responsibility.

D. Analysis Program: Capable of accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.

3.4 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Construction Manager at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, the Master Schedule and resubmit within 5 days.
   1. When project work is behind schedule indicate revisions required to put the project on schedule.
   2. Payments will not be approved until satisfactory evidence is presented, by the Contractor(s) behind schedule, to put the project on schedule.

3.5 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Update diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

3.6 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Fuller and D'Angelo, P.C., Construction Manager, other Prime Contractors, subcontractors, major suppliers, and Contractor's site files and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

3.7 CHANGES, DELAYS AND EXTENSIONS OF TIME

A. When changes or delays are experienced, each Contractor shall submit to the Construction Manager a Time Impact Analysis illustrating the influence of each change or delay on the current Contract scheduled completion date. Each time analysis shall include a Fragment (network analysis) demonstrating how the Contractor proposed to incorporate the change or delay into the Detailed Schedule.
   1. Each time analysis shall include a Fragment (network analysis) demonstrating how the Contractor proposed to incorporate the change or delay into the Detailed Schedule.
   2. The analysis shall demonstrate the time impact based on the date the change was given to the Contractor, the status of construction at that point in time, and the activity duration of all effected activities.
   3. The activity duration used in this analysis shall be those included in the latest update of the Detailed Schedule, closest to the time of delay or as adjusted by mutual agreement.

B. Each Time Impact Analysis shall be submitted within ten (10) calendar days after a delay occurs or a notice of change order is given to the Contractor. In cases where the Contractor does not submit a Time Impact Analysis for a specific change or delay with a specified period of time, it shall be mutually agreed that no time extension is required. Final evaluation of each Time Impact Analysis by the Construction Manager shall be made within fourteen (14) calendar days after receipt unless subsequent meetings and negotiations are necessary. Adjustments in the Contract time for performance shall be made only by written change order approved by the Owner. Upon approval of the Owner, Fragments illustrating the influence of changes and delays shall be incorporated into the Detailed Schedule by the contractor during the first update after agreement is reached.

END OF SECTION

NON-DISCRIMINATION CLAUSES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. During the performance of this contract, the contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, color or national origin. Such action shall be taken with reference, but not be limited, to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the job training.
2. The contractor will send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the contractor's agreement under these clauses hereinafter called "non-discrimination clauses" and requesting such labor union or representative to agree in writing, standing or otherwise, that such labor union or representative will not discriminate against any member or applicant for membership because of race, creed, color or natural origin. Such action shall be taken with reference, but not limited, to: recruitment, employment job assignment, promotion, upgrading, demotion, transfer, layoff, or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training. Such notice shall be given by the Contractor, and such written agreement shall be made by such labor union or representative, prior to the commencement of performance of this contract. If such labor union or representative fails or refuses so to agree in writing the Contractor shall promptly notify the State Commission of Human Rights of such failure or refusal.
3. The Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses and such provisions of the State's laws against discrimination as the State Commission for Human Rights shall determine.
4. The Contractor will state, in all solicitation or advertisements for employees placed by or on behalf of the contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.
5. The Contractor will comply with the provisions of Section 291-299 of the Executive Law and the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to his books, records and accounts by the State Commission for Human Rights, the Attorney General and the Industrial Commissioner for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.
6. This contract may be forthwith canceled, terminated or suspended, in whole or in part by the Owner upon the basis of a finding made by the State Commission for Human Rights that the contractor has not complied with these nondiscrimination clauses, and the Contractor may be declared ineligible for future contracts made by or on behalf of the Owner or agency of the Owner, until he or it satisfies the State Commission for Human Rights that he or it has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings shall be made by the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these nondiscrimination clauses and after a verified complaint has been filed with the Commission, notice thereof has been given to the Contractor and an opportunity has been afforded him to be heard publicly before three members of

the Commission. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions or remedies otherwise provided by law.

7. If this Contract is canceled or terminated under the above clause, in addition to other rights of the Owner, provided in this contract upon its breach by the Contractor, the Contractor will hold the Owner harmless against any additional expenses or costs incurred by the Owner in completing the work or in purchasing the services, materials, equipment or supplies contemplated by this contract, and the Owner may withhold payments from the contractors in an amount sufficient for this purpose and recourse may be had against the surety on the performance bond if necessary.
8. The Contractor will include the provisions of these clauses in every sub-contract or purchase order in such a manner that such provisions will be binding upon each sub-contractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such Sub-Contract or purchase order as the contracting agency may direct, including sanctions or remedies for non-compliance. If the contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor shall promptly so notify the Attorney General, requesting him to intervene and protect the interests of the Owner.

END OF SECTION

SED SPECIAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies special requirements of State Education Department, including Commissioner's Regulation Part 155.5, 155.7

1. Copies of Commissioner's Regulation Part 155.5, 155.7 are available on the State Education Department's web site.www.p12nysed.gov

1.3 CERTIFICATE OF OCCUPANCY

A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a Certificate of Occupancy.

1.4 GENERAL SAFETY AND SECURITY DURING CONSTRUCTION

A. All construction materials shall be stored in a safe and secure manner.

1. Fences around construction supplies or debris shall be maintained.
2. Gates shall always be locked unless a worker is in attendance, to prevent unauthorized entry.
3. 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.
4. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

1.5 SEPARATION OF CONSTRUCTION

A. Separation of construction areas from occupied spaces. Construction areas that 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. Metal stud and gypsum board (Type X) 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 may be assigned for construction worker use during work hours, when approved by the Owner. Workers may not use corridors, stairs or elevators designated for students or school staff.
    a. 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.
    b. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each work day. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

1.6 FIRE PREVENTION

A. There is no smoking on school property for fire prevention and New York State Law.

B. Any holes in floors or walls shall be sealed with a fire resistant material.

C. Owner shall maintain existing fire extinguishers.

D. Fire alarm and smoke detection systems shall remain in operation at all times.

1.7 CONSTRUCTION DIRECTIVES

A. 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 abatement measures shall be taken.

1. Construction Fume Control: Each Contractor shall be responsible for the control of chemical fumes, gases, 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.
2. Off-Gassing Control. Each Contractor shall be responsible to 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.

1.8 ASBESTOS/LEAD PAINT/HAZARDOUS MATERIAL

A. Asbestos/Lead Test Asbestos Letter. Indication that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and asbestos.

B. Asbestos Code Rule 56. Large and small asbestos abatement projects as defined by 8 NYCRR 155.5(k) shall not be performed while the building is occupied. Note: It is SED's interpretation that the term "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).

1. Asbestos TEM. 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.

C. Lead Abatement Projects. A project that contains materials identified to be disturbed which tests positive for lead shall include that information in the Construction Documents. The Construction Documents must address the availability of lead testing data for the building and include a statement that the OSHA regulations be followed and that cleanup and testing be done by HUD protocol.

D. Hazardous Material: A project that disturbs or may disturb PCB containing material will have all work done in accordance with all applicable regulations.

1.9 VENTILATION

A. The work, as scheduled in the existing building, is to be performed when the facility is unoccupied. In the event that work is required to be performed during times when the building is occupied, all existing ventilation system between areas of work and areas of occupancy shall be disconnected, separated and code complying ventilation requirements be provided the occupied area. Prior to such work commencing the contractor shall submit a plan, for review indicating procedure to be taken. Also see paragraph 1.5 above for additional requirements."

1.10 ELECTRICAL CERTIFICATION:

A. The electrical Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.

1.11 EXITING

A. Exiting: For work to be performed when school is in session all exiting will be clear and usable at all times. For work to be performed when school is not in session or after hours maintain legal exiting.

B. Exits required shall be clear and usable at all times.

C. All modifications or changes to the exiting plan shall be approved by Fuller and D'Angelo, Architects and Planners, .

1.12 CONSTRUCTION WORKER IN OCCUPIED AREAS

A. No worker shall be permitted in areas occupied by students. If access is required by the contractor's personnel they will be supervised by District personnel. Contractor shall provide 24 hour notice to the Owner when such access will be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SITE SAFETY AND SECURITY PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. The safety requirements, which must be followed by each Contractor during the execution of this contract.

B. Each Contractor agrees that the work will be completed with the greatest degree of safety and:

1. To conform to the requirements of the Occupational Safety and Health Act (OSHA) and the Construction Safety Act including all standards and regulations that have been or shall be promulgated by the governmental authorities which administer such acts, and shall hold the Owner, Owner's Representative, Architect, and Construction Manager and all their employees, consultants and representatives harmless from and against and shall indemnify each and everyone of them for any and all claims, actions, liabilities, costs and expenses, including attorneys fees, which any of them may incur as a result of non-compliance.

C. Security measures including entry control, personnel identification, and miscellaneous restrictions.

1.3 REFERENCES:

A. Code of Federal Regulations OSHA Safety and Health.

B. Reference Drawing "Site Safety and Logistics Plan"**.**

1.4 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts: Use of premises and occupancy .

B. Section 01 5000 - Temporary Facilities and Controls01 5000: Temporary lighting and barriers and enclosures.

C. Section 01 5500 - Vehicular Access and Parking.

1.5 DEFINITIONS

A. Public shall mean anyone not involved with or employed by the contractor to perform the duties of this contract.

B. Site shall mean the limits of the work area.

C. Contractor shall mean the contractor, his/her subcontractors and any other person related to the contract execution.

1.6 SECURITY PROGRAM

A. Security and Protection Facilities and Services shall be the responsibility of the each Contractor and all costs shall be included in their bid.

B. Protect Work, existing premises and Port Chester-Rye UFSD's operations from theft, vandalism, and unauthorized entry.

C. Initiate program in coordination with Port Chester-Rye UFSD's existing security system thru the Construction Manager at project mobilization.

D. Maintain program throughout construction period until directed by Construction Manager.

1.7 ENTRY CONTROL

A. The existing building contains a security alarm system maintained and operated by the Owner. Access into the existing building shall not be permitted unless the Construction Manager is notified and arrangements made to deactivate the system

B. Restrict entrance of persons and vehicles into Project site and existing facilities.Owner

C. Allow entrance only to authorized persons with proper identification.

D. Maintain log of workers and visitors, make available to Construction Manager on request.

E. Port Chester-Rye UFSD will control entrance of persons and vehicles related to Port Chester-Rye UFSD's operations.

F. Coordinate access of Port Chester-Rye UFSD's personnel to site in coordination with Construction Manager and Port Chester-Rye UFSD and security forces thru the Construction Manager.

G. Install substantial and durable general temporary enclosure of partially completed areas of construction. Provide locking entrances adequate to prevent unauthorized entrance, vandalism, theft and similar violations of project security.

H. Traffic Control

1. Each Contractor shall maintain access for emergency vehicles and pedestrians and protect from damage all persons and property within the limits of and for the duration of the contract; as required by the contract documents.
2. Conduct construction operations so that the traveling public and pedestrian safety is subjected to a minimum of hazard and delay.
3. Each Contractor shall perform the following minimum requirements and as directed by Construction Manager.
    a. Keep the surface of the traveled way free from mounds, depressions, and obstructions of any type which could present hazards or annoyance to traffic.
    b. Keep the surface of all pavements used by the public free and clean of all dirt, debris, stone, timber, roofing, and masonry or other obstructions to provide safe traveled ways.
    c. Control dust and keep the traveled way free from materials spilled from hauling and construction equipment.
    d. Provide all cones, barricades, signs and warning devices as may be required and/or as ordered by Construction Manager to safely carry out the foregoing. All such signs and devices shall be fabricated and placed in accordance with the latest “Federal Manual on Uniform Control Devices”. Use of Open Flares Is Prohibited.
    e. Prepare and submit for approval sketch/drawing showing proposed location and type of signs, barricades and devices as required in Par. 6 above.
    f. Each Contractor shall cover with steel plates all open trenches at the close of each work day. Such plates to abut each other and be wedged at each end of trench to prevent plates from sliding open. Coordinate as required with other Contractors and Construction Manager.
4. Ingress and Egress
    a. Each Contractor shall provide and maintain at all times safe and adequate ingress and egress to and from site at existing or at new access points consistent with work, unless otherwise authorized by the Construction Manager.
5. If, upon notification by Construction Manager, and the Contractor(s) fails to correct any unsatisfactory condition within 24 hours of being so directed,Construction Manager will immediately proceed with adequate forces to properly maintain the project and the entire cost of such maintenance shall be deducted (back charged) from any moneys due the contractor.
6. All traffic control costs shall be included in the base bid for furnishing all labor, material and equipment including the cost of any and all incidental required by job conditions as ordered by Construction Manager .
7. Withholding of Payment
    a. No payment will be made under Maintenance and Protection of Traffic for each calendar day during which there are substantial deficiencies in compliance with the specification requirements of any subsection of this section, as determined by the Architect/Engineer.

b. The amount of calendar day nonpayment will be determined by dividing the lump sum amount bid for Maintenance and Protection of Traffic by the number of calendar days between the date of the contractor commences work and the date of completion, as designated in the proposal, without regard to any extension of time.

c. In addition, for each calendar day or part thereof of any unsatisfactory work violating the required provisions of any subsection under Traffic Control, liquidated damages will be assessed as listed in the General Conditions.

d. If Each Contractor fails to maintain and protect traffic adequately and safely for a period of 24 hours, the Construction Manager shall correct the adverse conditions by any means he deems appropriate, and shall deduct the cost of the corrective work from any Monies due the Contractor(s). The cost of this work shall be in addition to the liquidated damages and nonpayment for Traffic Control listed above.

e. However, where major nonconformance with the requirements of this specification is noted by the Construction Manager and prompt contractor compliance is deemed not to be obtainable, all contract work may be stopped by direct order of the Construction Manager regardless of whether corrections are made by the Construction Manager as stated in the paragraph above

1.8 FIRE PREVENTION AND CONTROL

A. Each Contractor shall provide Fire Extinguishers as follows: Provide type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical fires or grease-oil-flammable liquid fires. In other locations provide either type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

B. All required exits, fire alarm, and security and similar systems shall be maintained and operable throughout the entire construction contract.

1. Contractor(s) will be back-charged for all fines imposed for false alarms or service calls.

C. Free access to fire hydrants and standpipe connections shall be maintained at all times during construction operations. Portable fire extinguishers shall be provided by each Contractor and made conveniently available throughout the construction site. Contractor(s) shall notify their employees of the location of the nearest fire alarm pull stations at all locations where work is in progress.

D. Each Contractor shall take all possible precautions for the prevention of fires. Where flame cutting torches, blow torches, or welding tools are required to be used within the building, their use shall be as approved by the Construction Manager at the site. When welding tools or torches of any type are in use, have available in the immediate vicinity of the work a fire extinguisher of the dry chemical 20 lbs. Type. The fire extinguisher(s) shall be provided and maintained by the Contractor doing such work.

E. Fuel for cutting and heating torches shall be gas only and shall be contained in Underwriters laboratory approved containers.

F. Storage of gas shall be in locations as approved by the Construction Manager and subject to Fire Department regulations and requirements.

G. No volatile liquids shall be used for cleaning agents or as fuels for motorized equipment or tools within a building except with the express approval of the Owner and/or Architect and in accordance with local codes. On-site bulk storage of volatile liquids shall be outside the buildings at locations directed by the Owner, who shall determine the extent of volatile liquid allowed within the building at any given time.

H. Each Contractor shall comply with the following requirements relating to compressed gas:

1. Where compressed gas of any type is used for any purpose at the site, it shall be contained in cylinders complying with ICC regulations. Gases of different types shall not be stored together except when in use and when such proximity is required.

2. All gas cylinders shall be stored in sheds constructed of noncombustible materials. Sheds shall be well ventilated and without electric lights or fixtures and shall be located as far from other

buildings as is practicable. All gas cylinders not in actual use, or in proposed immediate use, shall be removed from the building under construction or reconstruction. Empty gas cylinders shall be removed prior to bringing in a replacement cylinder. Cylinders shall at all times be supported and braced in an upright position. When not in use, the protective cap shall be screwed over the valve.

3. All persons required to handle gas cylinders or to act as temporary firemen (Fire Watchers) shall be able to read, write and understand the English language; they shall also be required by the Contractor to read Part 3 of Pamphlet P-1 "Safe Handling of Compressed Gases" published by the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
4. Where local ordinances are in effect regarding gas cylinders, (their use, appurtenances and handling), such ordinances shall supplement the requirements of this paragraph. All personnel engaged in fire watch shall be certified by the Local Fire Department having jurisdiction.
5. LP-Gas Heating will not be permitted in enclosed areas below grade.
6. Any cylinder not having the proper ICC markings or reinspection marking, or any cylinder with a leak shall be isolated immediately away from any building and the supplier shall be immediately notified; such other precautions as may be required to prevent damage or injury shall also be taken by the Contractor.

1.9 PERSONNEL IDENTIFICATION

A. Provide identification badge or other approved identification to each person authorized to enter premises.
   1. Identification To Include: Personal photograph, name and employer.

B. Maintain a list of accredited persons, submit copy to Port Chester-Rye UFSD on request.

C. Require return of badges at expiration of their employment on the Work.

D. Fingerprinting: The Contractor acknowledges and agrees that he/she or its employees may be subject to fingerprinting and a criminal history record check as may be required by the Educational Law of the State of State of New York. In such an event, Contractor agrees to cooperate with Port Chester-Rye UFSD and to complete any and all forms or procedures, all at no cost or expense to the Port Chester-Rye UFSD.

1.10 RESTRICTIONS

A. Do not allow cameras on site or photographs taken except by written approval of Construction Manager.

PART 2 PRODUCTS -

2.1 MATERIALS

A. Refer to Section 01 5000 - Temporary Facilities and Controls for additional barrier requirements.

B. Barriers shall be constructed of sturdy lumber having a minimum size of 2 x 4.

C. Signs shall be made of sturdy plywood of 1/2" minimum thickness and shall be made to legible at a distance of 50 feet.

PART 3 EXECUTION

3.1 GENERAL

A. In the performance of its contract, each Contractor shall exercise every precaution to prevent injury to workers and the public or damage to property.
   1. Each Contractor shall, at their own expense, provide temporary structures, place watchmen, design and erect barricades, fences and railings, give warnings, display such lights, signals and signs, exercise such precautions against fire, adopt and enforce such rules and regulations, and take such other precautions as may be necessary, desirable or proper or as may be directed.
   2. Each Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work to be done under this contract. Each Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss including but not limited to:
      a. All employees working in connection with this contract, and other persons who may be affected thereby.

b. All the work materials and equipment to be incorporated therein whether in storage on or off site; and including trees, shrubs, lawns, walks, pavements, facilities not designated for removal, relocation or replacement in the course of construction.

B. Each Contractor's duties and responsibilities for the safety and protection of the work: shall continue until such time as all the work is completed and contractor has removed all workers, material and equipment from the site, or the issuance of the certificate of final completion, whichever shall occur last.

C. Each Contractor shall use only machinery and equipment adapted to operate with the least possible noise, and shall so conduct his operations that annoyance to occupants of the site and nearby homes and facilities shall be reduced to a minimum

D. It shall be the responsibility of each Contractor to insure that all employees of the contractor and all subcontractors, and any other persons associated with the performance of their contract shall comply with the provisions of this specification.

E. Each Contractor shall clean up the site daily and keep the site free of debris, refuse, rubbish, and scrap materials. The site shall be kept in a neat and orderly fashion. Before the termination of the contract. Each Contractor shall remove all surplus materials, falsework, temporary fences, temporary structures, including foundations thereof.

F. Each Contractor shall follow all rules and regulations put forth in the Code of Federal Regulations (OSHA Safety and Health Standards).

END OF SECTION

PREVAILING WAGE RATES

1.1 RELATED DOCUMENTS

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

1.2 PROVISIONS OF LAW DEEMED INSERTED

A. Each and every provision of law and clauses required by law to be inserted in the Contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the Contract shall forthwith be physically amended to make such insertion.

B. The Contractor and subcontractors shall comply with applicable provisions of the Labor Law and all other state laws and Federal and Local statues ordinances, codes, rules and regulations and orders which are applicable to the performance of this contract. The Contractor shall likewise require all sub-contractors to comply therewith. The attention of the Contractor is particularly, but not exclusively, directed to Sections 220 through 223 of the New York State Labor Law and Sections 109 of the New York State Municipal Corporations Law and the following:

1. The Contractor shall post the prevailing wages in a conspicuous place on the job site.
2. Posters shall list the Department of Labor's Public work field offices with telephone numbers.

C. All contractors and subcontractors shall furnish each of its workers with written notification of the applicable prevailing wage rates and supplements at the commencement of and at periodic intervals during the performance of the Work as required by the New York Labor Law

D. The Contractor shall provide and keep certified payroll records at the job site.

E. Prevailing Wages Schedule for this project can be obtained by the bidders on the DOL web site as follows:

1. http://www.labor.ny.gov/workerprotection/publicwork/PWContents.shtm.
2. Click on: "Request for Wage and Supplement Information" (PW39).
3. View "Previously Requested Prevailing Wage Schedule" using PRC# 2017012594

F. NOTE THESE WAGE RATES ARE EFFECTIVE UNTIL JUNE 30, of each year. Updated schedules will be available on the Department of Labor web site: www.labor.state.ny.us

END OF SECTION

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Testing and inspection agencies and services.

D. Contractor's construction-related professional design services.

E. Contractor's design-related professional design services.

F. Control of installation.

G. Mock-ups.

H. Tolerances.

I. Manufacturers' field services.

J. Defect Assessment.

1.3 RELATED REQUIREMENTS

A. Section 00 7200 - General Conditions: Inspections and approvals required by public authorities.

B. Section 01 3000 - Administrative Requirements: Submittal procedures.

C. Section 01 4216 - Definitions.

D. Section 01 4219 - Reference Standards.

E. Section 01 4534 - Code Required Special Inspections.

F. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.4 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a, with Editorial Revision (2016).

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2018.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.

G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2017.

1.5 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary sheeting, shoring, or supports.

2. Temporary scaffolding.
3. Temporary foundation underpinning.
4. Temporary stairs or steps required for construction access only.
5. Temporary hoist(s) and rigging.

1.6 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Testing Agency Qualifications:
1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

C. Design Data: Submit for Construction Manager's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Port Chester-Rye UFSD's information.

D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and Construction Manager:
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect and Construction Manager, provide interpretation of results.
2. Test report submittals are for Architect and Construction Manager's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect and Construction Manager, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and Construction Manager.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Architect and Construction Manager's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

G. Manufacturer's Field Reports: Submit reports for Architect and Construction Manager's benefit as contract administrator.
   1. Submit report in PDF format within 30 days of observation to Architect, Construction Manager, and Contractor for information.
   2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

H. Erection Drawings: Submit drawings for Architect and Construction Manager's benefit as contract administrator..
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect and Construction Manager.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in New York.

1.9 REFERENCES AND STANDARDS - See Section 01 4219

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Port Chester-Rye UFSD will employ and pay for services of an independent testing agency to perform specified testing which is the responsibility of the Owner.

B. As indicated in individual specification sections, Contractor shall employ and pay for services of an independent testing agency to perform specified testing which is the responsibility of the Contractor.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:
   1. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
   2. Laboratory: Authorized to operate in New York.
   3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
   4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Construction Manager before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality for Architect and Construction Manager will use to judge the Work.

C. Notify Architect and Construction Manager fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

G. Obtain Architect and Construction Manager's approval of mock-ups before starting work, fabrication, or construction.

1. Construction Manager will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
2. Make corrections as necessary until Architect's approval is issued.

H. Accepted mock-ups shall be a comparison standard for the remaining Work.

I. Where mock-up has been accepted by Architect and Construction Manager and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Construction Manager.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Fuller and D'Angelo P.C. before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Construction Manager and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect , Construction Manager, and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests and inspections required by Architect and Construction Manager.
7. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of the Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Architect and Construction Manager and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Port Chester-Rye UFSD's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Owner's Representative, Architect, and Construction Manager.

F. Re-testing required because of non-conformance to specified requirements shall be shall be performed by the same agency on instructions by Construction Manager paid for by Contractor.

3.5 OWNER'S TESTING AND INSPECTIONS

A. Coordinate with Construction Manager.

B. Owner will engage a qualified testing agency or special inspector to conduct tests and inspections are the responsibility of Owner and paid for by Owner as follows:
1. Reefer to Section 01 4534 - Code Required Special Inspections.
2. Asbestos inspection and air monitoring
3. Soil bearing capacity and bottom of footings.
4. Compaction and backfilling.
5. Compaction of structural fill.
6. Wall footings and pier footing reinforcing, size and placement.
7. Foundation wall reinforcing and placement.
8. Slab on grade thickness and reinforcing placement.
9. Floor slabs above grade thickness and reinforcing placement.
10. Concrete samples and compression tests.
11. Mortar sampling and testing.
12. Placement of joint reinforcement.
13. Placement of anchors.

14. Placement of concealed flashing.
15. Cast stone anchors.
16. Placement of cavity insulation.
17. Placement of cavity drainage material.
18. Placement of weep holes.
19. Structural steel column, beam and miscellaneous framing members..
20. Field bolts & welded connections.
21. Shop fabrication and welding.
22. Welder's certificates.
23. Steel studs.
24. Placement and type of metal deck.
25. Attachment of deck to steel.
26. Pour stops and framed openings.
27. Testing of shear studs.
28. Size, placement and fasteners of light gauge metal framing.
29. Exterior wall system including metal framing fasteners, gypsum sheathing, vapor barrier, masonry, insulation
30. Aluminum windows connections and fasteners.
31. Firestopping.
32. Radon testing.

C. Contractor shall perform the work in an efficient manner consistent with industry standards. Excessive testing resulting from the contractor's inability to perform efficiently will result in back charges to the contractor.

D. All re-inspections required for work not properly installed shall be paid for by the contractor.

E. The Owner will not be liable for any costs or delay claims due to the testing agency or special inspector failure to provide inspection without proper and sufficient notification.

F. All requests by the contractor for inspection that are cancelled and result in charges to the Owner will be back charged to the contractor.

3.6 CONTRACTOR'S TESTING AND INSPECTION

A. Testing and Inspections shall be conducted by a qualified testing agency or special inspector, approved by the Construction Manager as required by authorities having jurisdiction and as indicated in individual Specification Sections as the contractor's responsibility including but not limited to:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Construction Manager promptly of irregularities and deficiencies observed in the work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Construction Manager with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.
7. All design mixes.
8. Testing and balancing of all mechanical and plumbing.
9. Testing Fire Alarm, smoke detection systems, and emergency light
10. Testing technology data and communications systems.

11. Testing fire protection system.
12. Testing public address system.
13. Electrical systems.
14. Electrical Certification: The Electrical Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.
15. Testing as required by individual specification sections.

3.7 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start up of equipment, testing, and adjusting testing as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Construction Manager 30 days in advance of required observations.
   1. Observer subject to approval of Architect and Construction Manager.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.8 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect and Construction Manager, it is not practical to remove and replace the Work, Architect and Construction Manager will direct an appropriate remedy or adjust payment.

END OF SECTION

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY of REFERENCE STANDARDS

A. The Owner shall file and obtain the Building Permit.

B. Regulatory requirements applicable to this project are the following:

C. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

E. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.

F. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

G. NFPA 1 - Fire Code; 2018.

H. NFPA 101 - Life Safety Code; 2017.

I. NFPA 72 - National Fire Alarm Code

J. New York State Uniform Fire and Building Codes known as the “Building Codes of the State of New York” and consist of the following:

1. State Education Department Planning Standards, including Commissioner's Regulation Part 155.5, 155.7
2. Energy Conservation Construction Code of New York State
3. Fire Code of New York State
4. Fuel Gas Code of New York State
5. Mechanical Code of New York State
6. Plumbing Code of New York State
7. Utility Company Regulations and Requirements.
8. Classification of Construction: Type IIB.
9. Occupancy Classification:Education E
10. State Education Department: Planning Standards is applicable to the work. Any conflicts between the Building Codes of New York and the State Education Department Planning Standards, the most restrictive shall apply. Copies of the Planning standards are available at the SED web site.

K. Electrical Certification: The Electrical Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for certification of electrical installations.

L. Each Contractor shall furnish and pay for all other permits, fees and other installation costs required for the various installations by governing authorities and utility companies; prepare and file drawings and diagrams required; arrange for inspections of any and all parts of the work required by the authorities and furnish all certificates necessary to the Owner's Representative, Architect, and Construction Manager as evidence that the work installed under this Project conforms with all applicable requirements of the State Codes, National Board of Fire Underwriters, and National Electric Code.

M. Any items of work specified herein and shown on the drawings which conflict with aforementioned rules, regulations and requirements, shall be referred to the Architect, Owner, and Construction Manager for decision, which decision shall be final and binding.

N. The work shall not be deemed to have reached a state of completion until the certificates have been delivered

O. EPA - Environmental Protection Agency

P. IEEE - Institute of Electrical And Electronic Engineers

Q. NEMA - National Electrical Manufacturers Association

R. UL - Underwriters Laboratories

S. OSHA Part 1926 Safety and Health Regulations for Construction.

T. Federal Regulation for Asbestos Abatement
1. Title 30 CFR Part 61, Subpart G; The Transport and Disposal of Asbestos Waste
2. The Transport and Disposal of Asbestos Waste]
3. Title 40 CFR, Part 763 Asbestos Containing Materials in Schools; Final Rule and Notice
4. Title 49 CFR Parts 106, 107, and 171-179.The Transportation Safety Act of 1974 and the Hazardous Material Transportation Act..
5. Public Law 101-637 ASHARA

U. New York State Official Compilation of Codes, Rules and Regulations
1. Title 12 Part 56
2. Title 10 Part 73
3. Title 6 Parts 360-364
4. Labor Law - Article 30 and Sections 900-912
5. All applicable Additions, Addenda, Variances and Regulatory Interpretation Memoranda

1.3 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

A. Pursuant to NYS Labor Law §220-h - All laborers, workers and mechanics working on the site are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

B. All contractors and their subcontractor's project superintendent, employees, directly or indirectly employed by the contractor to work on the project must at all times, whenever on the school property, wear an ID badge, safety vest, hard hat, etc. and all other required personal protective equipment as required by OSHA

1.4 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements.

B. Section 01 4219 - Reference Standards

C. Section 02 2080 - Asbestos Abatement.

D. Division 22 - Plumbing.

Division 23 - Heating, Ventilation and Air Conditioning.

Division 26 - Electrical.

E. Division 31 - Earthwork.

F. Division 32 - Exterior Improvements

G. Division 33 - Utilities.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in New York .

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

DEFINITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.3 DEFINITIONS

A. Owner: The term “Owner shall mean Port Chester-Rye UFSD and their duly authorized representative.
   1. The word “Owner” and the words “School Board”, “City School District”, “Board of Education”, “Union Free School District”, “Central School District”, etc., shall have the same meaning.

B. Architect: The term "Architect" or “Engineer” or the words “Architect/Engineer” shall mean the Professional Architect responsible for the contract documents, Fuller and D'angelo Architects and Planners.

C. Owner's Representative: The term Owner's Representative shall mean School Construction Consultants

D. Construction Manager: The term Construction Manager shall mean School Construction Consultants

E. The term Consultant shall mean those firm listed on the cover of Project Manual

F. Contractor for Construction: The term “Contractor for Construction”, “General Contractor” “Contractor for General Work” “Construction Contractor” shall have the same meaning.

G. Contractor for Plumbing: The term “Plumbing Contract”, “Plumbing Contractor” “Contractor for Plumbing” shall have the same meaning.

H. Contractor for Mechanical: The term "Mechanical Contractor" “HVAC Contract”, “HVAC Contractor” “Contractor for HVAC”, "Heating, Ventilation and Air Conditioning Contractor" shall have the same meaning.

I. Contractor for Electrical: The term “Electrical Contract”, Electrical Contractor” “Contractor for Electric” shall have the same meaning.

J. Contractor(s): Shall include all separate contractor(s) have contracts with the Owner for the same project and may include but not limited to: General Construction, Plumbing, HV, HVAC, Electrical, Site and others.

K. Prime Contractors: Shall include all separate contractors have contractors with the Owner for the same project and may include but not limited to: General Construction, Plumbing, Mechanical Contractor, Electrical, and Site and others

L. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract and Section 01 3000 - Administrative Requirements.

M. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

N. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

O. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

P. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

Q. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

R. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

S. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

T. The term “Building Code” shall mean the Building Code of the State of New York including all amendments and reference standards to date.

U. "Work" - Labor, materials, equipment, apparatus, controls, accessories, and all other items customarily furnished and/or required for proper and complete disconnection and reconnection, installation of new work.

V. "Wiring" - Conduit, fittings, wire, junction and outlet boxes, switches, cutouts, and receptacles and all items necessary or required in connection with or relating to such wiring.

W. "Concealed" - Embedded in masonry or other construction, installed behind wall furring, within double partitions, or hung ceilings, in trenches, or in crawl spaces.

X. "Exposed" - Not installed underground or "Concealed" as defined above.

Y. Furnish: The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations..

Z. Install: The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

AA. 'Noted' - as indicated on the drawings and/or specifications.

AB. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

AC. Provide: To furnish and install complete and ready for the intended use.

AD. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

REFERENCE STANDARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Requirements relating to referenced standards.

1.3 RELATED REQUIREMENTS

A. Document 00 7200 - General Conditions: Reference standards.

1.4 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Obtain copies of standards when required by the Contract Documents.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Fuller and D'Angelo P.C. before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Fuller and D'Angelo P.C. shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.5 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract and Section 01422 Definitions

1.6 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents, including reference standards in codes having jurisdiction, 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. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

C. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

D. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

PART 2 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.1 Abbreviations and Names:

A. Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries or the internet.

END OF SECTION

SPECIAL INSPECTIONS AND STRUCTURAL TESTING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the *New York State Uniform Code* (NYSUC).

1.2 DEFINITIONS

A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional in this section refer to the Structural Engineer for building design.

B. RDP for Geotechnical Engineering: Licensed Professional Engineer whose seal appears on the Geotechnical Investigation. The RDP for Geotechnical Engineering shall perform or oversee Agent 2 services as indicated in the Schedule of Special Inspections. If a Geotechnical Investigation was not performed or if the RDP for Geotechnical Engineering is not retained to perform Agent 2 services, a licensed Geotechnical Engineer shall be retained to perform these duties.

C. Code Enforcement Official: Officer or other designated authority charged with administration and enforcement of the NYSUC. For projects under jurisdiction of New York State agencies such as the Department of Education (SED), State University Construction Fund (SUCF), Office of General Services (OGS), and Dormitory Authority (DASNY), the Code Enforcement Official is an official from agency having jurisdiction.

D. Special Inspector (SI): Professional Engineer licensed in the State of New York, acting on behalf of the Owner, that implements the Special Inspection Program for the project.

E. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector.

F. Testing/Inspecting Agency (Agent 1): Professional Engineer licensed in the State of New York that is qualified to perform structural inspections. The Special Inspector shall have a minimum of three years of experience performing inspections for similar projects.

G. Testing/Inspecting Agency (Agent 2): Professional Geotechnical Engineer licensed in the state of New York that is qualified to perform inspections for preparation of building subgrades and foundations.

H. Testing/Inspecting Agency (Agents 3 or 4): Agency or firm qualified to inspect certain structural elements and perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.

I. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official as a condition of obtaining a building permit. These documents include this specification and the Schedule of Special Inspections.

J. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in Drawing S003.

K. Inspect and Inspection: Visual observation of materials, equipment, or construction work as defined in the Statement of Special Inspections, to determine that the work is in substantial conformance with the requirements of the Contract Documents.

L. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.

M. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

1.3 QUALIFICATIONS

A. Special Inspector and Testing/Inspecting Agency shall be accepted by the Registered Design Professional (RDP) and the Code Enforcement Official.

B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated in the drawings.

C. Minimum qualifications of inspection agents are indicated in the drawings.

1.4 SUBMITTALS

A. Special Inspector and Testing/Inspecting Agency shall submit to the Registered Design Professional and Code Enforcement Official for review, a copy of their qualifications including names and qualifications of each inspector and technician who will be performing inspections or tests.

B. Special Inspector and Testing/Inspecting Agency shall disclose past or current business relationship or potential conflict of interest with Contractor or Subcontractors whose work will be inspected or tested.

1.5 PAYMENT

A. Owner will engage and pay for services of Special Inspector and Testing/Inspecting Agency.

B. If materials requiring Special Inspections are fabricated in a plant not within 200 miles of project site, Contractor shall be responsible for travel expenses of Special Inspector or Testing/Inspecting Agency.

C. Contractor shall be responsible for cost of retesting or reinspection of work failing to comply with requirements of Contract Documents.

1.6 OWNER RESPONSIBILITIES

A. Owner will provide Special Inspector with complete set of Contract Documents sealed by the Registered Design Professional and approved by the Code Enforcement Official.

1.7 CONTRACTOR RESPONSIBILITIES

A. Contractor shall cooperate with Special Inspector and his agents so Special Inspections and testing may be performed without hindrance.

B. As indicated in the Schedule of Special Inspections, Contractor shall notify Special Inspector or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test.

C. Contractor shall provide incidental labor and facilities to provide access to work to be inspected or tested, to obtain and handle samples at site or at source of products to be tested, to facilitate tests and inspections, and for storing and curing of test samples.

D. If Special Inspections or testing require the use of Contractor's scaffolding to access work areas, Contractor shall provide competent person to perform daily evaluation of scaffolding to verify it is safe to use. Contractor shall notify Special Inspector and Testing Agent of this review before each use. Contractor is responsible for safe assembly and stability of scaffolding.

E. Contractor shall keep latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications at project site for field use by Inspectors and Testing Technicians.

F. Contractor shall perform remedial work if required and sign nonconformance reports stating remedial work has been completed. Contractor shall submit signed reports to Special Inspector as work proceeds.

G. The Special Inspection program shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents or from implementing an effective Quality Control program.

H. Contractor shall be solely responsible for construction site safety.

1.8 SPECIAL INSPECTOR RESPONSIBILITIES

A. Special Inspector shall hold a Special Inspections preconstruction meeting at least 7 days prior to initial planned date for start of construction. Attendees shall include Contractors, Owner's Representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture. Discussions shall include the following:

1. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
2. Responsibilities of Contractors, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
3. Notification and reporting procedures.

B. Special Inspector shall record and distribute minutes from the Special Inspection Preconstruction meeting.

C. Special Inspector shall review inspection and material testing reports and coordinate the services of the Testing/Inspecting Agencies as follows:

1. Verify inspections have been performed in accordance with the Schedule of Special Inspections.
2. Verify reports are being distributed to the Contractor, Owner, Architect, Code Enforcement Official, and Registered Design Professional (RDP) for Structural Engineering.
3. Verify discrepancies have been recorded and are being tracked.

D. Special Inspector shall make site visits to inspect work as designated in the Statement of Special Inspections. Discrepancies will be brought to the attention of the Contractor and RDP.

E. Special Inspector shall keep records of inspections and tests.

F. Special Inspector shall review Certificates of Compliance for conformance with the standards specified in the Contract Documents. Discrepancies will be brought to the attention of the Contractor and RDP.

G. Special Inspector shall submit a final report of Special Inspections in accordance with Section 1.3 of this specification.

1.9 LIMITS ON AUTHORITY

A. Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Special Inspector or Testing/Inspecting Agency shall not have control over Contractor’s means and methods of construction.

C. Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.

D. Special Inspector or Testing/Inspecting Agency shall not have authority to stop work.

PART 2 INSPECTIONS AND TESTING

2.1 EXCAVATION, BACKFILL, COMPACTION, AND DRILLED PIERS (BUILDING AREA)

A. Special Inspector shall perform inspections and verifications or coordinate the RDP for Geotechnical Engineering to perform inspections and verifications including the following:

1. Identify soils requiring undercutting and replacing while observing proof rolling and when subgrade is exposed.
2. Verify foundation bearing strata. Bedrock is sound,
3. Review and accept materials proposed by Contractor for use as compacted fill based on test data and information submitted by Testing Agency. Material approval shall be based on requirements and recommendations stated in Project Geotechnical and Subsurface Investigation.
4. Observe and accept filling and compaction procedures.
5. Observe and accept preparation of slab-on-grade subgrade and subbase.

B. Testing Agency shall perform field density tests for building subgrades and for fill materials including slab subbase within building area in accordance with ASTM D 6938 as follows:

1. Footing subgrade and each stratum of soil on which footings will be placed.
2. Building subgrade including slab subbase and each lift of compacted material.
3. Inspect each subgrade and fill layer before further backfill or construction work is performed. Approval shall be based on satisfactory achievement of compaction criteria.

4. Verify use of fill material and lift thicknesses in field.

C. Testing Agency shall perform moisture content testing of slab subbase in accordance with ASTM D 6938.

D. Drilled Pier Foundations:

1. Special Inspector shall perform inspections and verifications or coordinate the RDP for Geotechnical Engineering to perform inspections and verifications including the following:

a. Review pier location plan provided by Contractor.

b. Observe test pier installation and load testing.

c. Review records of load test results provided by Contractor.

d. Inspect pier reinforcement prior to installation.

e. Verify acceptable bearing strata and depths have been reached during installation.

f. Maintain installation records in accordance with 3.1B.

2. Testing Agency shall sample fresh concrete and perform compressive strength testing in accordance with Cast-In-Place Concrete section of this specification.

2.2 CAST-IN-PLACE CONCRETE

A. Special Inspector shall perform the following:

1. Inspect reinforcing steel and placement.

2. Inspect embedded bolts and anchor rods prior to concrete placement.

B. Testing Agency shall perform the following:

1. Verify use of required design mix.

2. Sample and test concrete during placement. Test shall be taken at point of discharge into structure:

a. Record specific locations where concrete was placed. Refer to column lines where possible.

b. For each truck, record time concrete is batched as shown in truck ticket, time placement begins/sample time, and time truck is emptied.

c. For each truck, sample fresh concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.

d. For each truck, perform slump test in accordance with ASTM C 143. Perform two slump tests for pumped concrete; one at truck and one at point of discharge.

e. For normal-weight concrete, measure air content in accordance with ASTM C 231, pressure method. For lightweight concrete, measure air content in accordance with ASTM C 173, volumetric method. Perform one test for each truck for air-entrained and non-air-entrained concrete.

f. Record temperature of concrete for each truck. Test in-place concrete temperature hourly when ambient temperature is 40 degrees F and below and when 80 degrees F and above.

g. Record air temperature and general weather conditions (cloudy, windy, sunny, etc.).

h. Record unit weight of fresh normal-weight concrete in accordance with ASTM C 138. Record unit weight of lightweight concrete in accordance with ASTM C 567. Perform one test for each 50-cubic yard of concrete.

i. Perform concrete compressive tests as follows:

a) Prepare compressive test specimens in accordance with ASTM C 31. Take a set of six 6 x 12 cylinders or nine 4 x 8 cylinders for each 50 cubic yards of concrete or each 5,000 square feet of slab area for each type of concrete. Store undisturbed in insulated box during cold weather. Deliver to laboratory between 16 and 32 hours after making. Perform compressive tests in accordance with ASTM C 39:

two 6 x 12 specimens (three 4 x 8 specimens) tested at 7 days, two 6 x 12 specimens (three 4 x 8 specimens) tested at 28 days, and two 6 x 12 specimens (three 4 x 8 specimens) retained for later testing if required.

b) In cold weather or whenever steel erection is scheduled to commence less than 14 days after placement of supporting foundation concrete, cast additional set of four 6 x 12 specimens (six 4 x 8 specimens) for each 50 cubic yards or fraction thereof of supporting foundation concrete. Field-cure cylinders, and test two 6 x 12 specimens (three 4 x 8 specimens) at 7 days, retaining two 6 x 12 specimens (three 4 x 8 specimens) for later testing if required. Steel erection may not begin until supporting concrete obtains 75 percent of its design strength.

c) If concrete will be placed in separate buildings on a given project, make individual compressive strength test cylinders for each building.

j. Perform additional testing if required:

a) Take additional set of cylinders for compressive strength testing for each truck in which total time period between batching and completing placement has exceeded ACI-recommended, 90-minute-maximum time limit. Take additional cylinders within 10 minutes of placement completion.

b) Make additional tests of in-place concrete when test results indicate specified concrete strengths or other characteristics have not been attained in structure.

c) Perform tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods acceptable to Architect.

d) Contractor shall reimburse Owner for cost of additional tests.

3. Inspect concrete placement for proper application techniques.

4. Inspect for maintenance of specified curing temperature and techniques.

5. Perform floor flatness (F_F) and levelness (F_L) testing of slabs receiving a trowel finish no later than 48 hours after slab placement in accordance with ASTM E 1155.

a. Each floor/level shall be divided into test section areas. F_F and F_L numbers for each test section area are local values.

b. Test section areas shall be minimum of 320 square feet with minimum boundary length of 8 feet for any side. Testing is not to be performed for smaller slab areas.

c. Test section areas shall be maximum of 2,000 square feet.

d. Test section areas shall not cross slab construction joints.

e. Locate test lines orthogonally or at 45 degrees to slab edges in accordance with ASTM E 1155 and no closer than 2 feet to any edge or opening.

f. Overall F_F and F_L numbers are for entire floor/level and shall be determined by considering measurements from all of test section areas on that floor/level.

g. (F_L) testing is not required for slabs on metal deck.

6. Perform moisture vapor emission and alkalinity testing in accordance with ASTM F 1869 and ASTM F 710, respectively, as follows:

a. Perform testing after building is enclosed, prior to installation of adhered floor finishes, and once HVAC systems are operational.

b. Test results must be reviewed and accepted by floor finish installer.

7. Inspect welding of reinforcing bars.

2.3 UNIT MASONRY

A. Special Inspector shall perform the following:

1. As masonry construction begins, the following shall be verified to ensure compliance:

a. Construction of mortar joints.

b. Location of joint reinforcement and connectors.

2. Verify:

a. Size and location of structural elements.

b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.

c. Specified size, grade, and type of reinforcement.

d. Protection of masonry during cold weather (temperature below 40˚F) or hot weather (temperature above 90˚F).

3. Prior to grouting, verify:

a. Grout space is clean.

b. Placement of reinforcement and connectors.

c. Construction of mortar joints.

4. Verify grout placement to ensure compliance with code and Construction Document provisions.

a. Grouting of CMU cells.

B. Testing Agency shall perform the following:

1. Verify for compliance with approved submittals:

a. Proportions of site-prepared mortar.

b. Proportions of site-prepared grout.

2. Inspect:

a. Welding of reinforcing bars.

3. Field Quality Control Testing: Perform tests and evaluations listed below during construction for each 5,000 square feet of wall area or portion thereof.

a. Sample and evaluate mortar composition and properties in accordance with ASTM C 780.

b. Sample and test grout compressive strength in accordance with ASTM C 1019.

c. For each type of wall construction indicated, test masonry prisms in accordance with ASTM C 1314 and as follows:

a) Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

2.4 STRUCTURAL STEEL (INCLUDING STEEL JOISTS AND METAL DECK)

A. Special Inspector shall perform the following:

1. Verify Fabricator maintains detailed fabrication and Quality Control procedures:

a. Review procedures for completeness and adequacy relative to code requirements.

b. If Fabricator is designated as AISC-Certified Fabricator, Special Inspection for shop-fabricated members and assemblies is not required.

c. If Fabricator is not designated as AISC-Certified Fabricator, Contractor shall reimburse Owner via execution of credit change order for cost of Special Inspections and testing in Fabricator's shop.

2. Review manufacturer's Certificates of Compliance for high-strength bolts and weld filler material.

3. Review certified mill test reports.

4. Inspect steel frame joint details for compliance with approved Construction Documents.

5. Inspect end connections and bridging of open-web steel joists and joist girders.

B. Testing Agency shall perform the following:

1. Material verification of high-strength bolts, nuts, and washers, including review of identification markings and manufacturer's Certificate of Compliance.
    a. Test high-strength bolt assemblies in a tension measuring device to verify material conformance prior to installation. Assemble bolt, nut, and washer on a loose plate and tension by tightening nut to develop required tension in Table 4 of "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Verification that copies of accepted field welding procedure specifications are available on site for reference by erector's welders.
3. Verification that erector's welder's qualifications are current and appropriate for joint type, welding position, and welding process to be used.
4. Verification that joint fit-up for partial and complete penetration groove welds are in compliance with AWS tolerances as follows:
    a. Visually inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
    b. Visually inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.
    c. Visually inspect 100 percent of tension member splices, column splices, and moment connections that are part of the lateral force resisting system.
5. Inspect high-strength bolting.
    a. Joints designated as snug tight require only visual inspection.
    b. Joints designated as fully tensioned or slip critical require visual inspection during installation.
    c. Checking after installation using calibrated wrenches will not be permitted.
6. Material verification of structural steel and metal deck, including review of identification markings.
7. Perform pull-out tests on adhesive, expansion, and sleeve anchors.
8. Material verification of weld filler materials, including review of identification markings.
9. Inspect welding of structural steel and metal deck.
    a. Visually inspect welds according to AWS.
    b. Schedule inspection of field welding in timely manner utilizing vertical access means and methods utilized by Contractor to perform the welding.
    c. Ultrasonic inspection (UT) according to ASTM E 587 is required for partial and complete penetration field groove welds as follows:
        a) UT inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
        b) UT inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.
        c) UT inspect 100 percent of tension member splices, column splices, and moment connections that are part of lateral force resisting system.
        d) UT inspect 50 percent or minimum of six of the joints scheduled for partial or complete penetration groove welds completed by each welder. Increase inspection percentage to 100 percent for each welder with more than one rejected weld.
    d. Magnetic particle inspection according to ASTM E 709 is required for Fabricators not certified by AISC Quality Certification Program for 10 percent of shop fillet welds.

e. Magnetic particle inspection according to ASTM E 709 is required for 10 percent of field fillet welds.

f. UT inspect according to ASTM E 587 is required for 10 percent of shop partial or complete penetration welds and 100 percent of shop partial or complete penetration groove welds in tension members.

g. Inspect shear connectors in accordance with AWS D1.1, Section 7. Observe bend tests performed by Contractor. Refer to Section 053000, Part 3 for bend test requirements.

h. Inspect every shear connector by striking once with 10-pound hammer. Direction of hammer swing shall be parallel with member containing connector. Inspection by striking with hammer does not replace bend tests in accordance with AWS.

10. Inspect welding of reinforcing steel.

11. Inspect condition of erected materials.

a. Visually inspect erected steel for damage.

b. Visually inspect connections and framing to verify compliance with Contract Documents and accepted shop drawings.

12. Inspect column plumbness and splices:

a. Inspect erected columns for plumbness within tolerances specified in Section 05 1200, Part 3: Execution.

b. Inspect columns for fit up within tolerances specified in AISC *Manual of Steel Construction*, Specification Section M4.

13. Inspect mechanical fasteners for metal deck, including connections to supporting structure and side-lap fastening.

a. Visually inspect 100 percent of mechanical deck fasteners and 50 percent using depth gauge tool provided by fastener manufacturer.

14. Additional testing shall be performed as follows if required.

a. Testing Agency shall perform additional tests of connections and framing members field modified by Contractor to correct errors in shop drawings, fabrication, or erection.

b. Anchor rods and embedded structural supports incorrectly located or damaged after installation shall be field modified by Contractor as indicated in Section 03 3000, Paragraph 3.4 and tested by Testing Agency.

c. Testing and reporting of field modifications shall be in accordance with this section, Special Inspections, and have the following additional requirements:

a) Magnetic particle inspection according to ASTM E 709 is required for 100 percent of fillet welds.

b) Ultrasonic inspection according to ASTM E 587 is required for 100 percent of full-penetration welds.

c) Perform pull-out tests on 100 percent of each type of adhesive, expansion, or sleeve anchor used by applying a load equal to 125 percent of allowable pull-out strength listed in manufacturer's literature.

d. Contractor shall reimburse Owner for cost of additional tests performed.

2.5 COLD-FORMED METAL FRAMING

A. Special Inspector shall perform the following:

1. Verify Fabricator maintains detailed fabrication and Quality Control procedures:

a. For Fabricators not previously registered and approved to perform such work without Special Inspection, review Quality Control procedures for completeness and adequacy relative to code requirements for Fabricator's scope of work.

2. Visually inspect installation of clips, hangers, hurricane ties, and miscellaneous connectors.
3. Visually inspect framing and details.

B. Testing Agent shall perform the following:
1. Verify member size and thickness.
2. Verify weight of galvanized coating according to ASTM A 90.
3. Visually inspect framing for damage.
4. Visually inspect welds according to AWS.
5. Perform pull-out tests on adhesive, expansion, and sleeve anchors.

2.6 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS

A. Verify penetration firestops in accordance with ASTM E2174.

B. Verify fire resistant joints in accordance with ASTM E2393.

2.7 SPECIAL INSPECTIONS FOR SMOKE CONTROL

A. Test smoke control systems as follows:
1. Record device locations and test system for leakage after erection of ductwork but before starting construction that conceals or blocks access to system.
2. Test and record pressure difference, flow measurements, detection function and controls after system is complete and before structure is occupied.

PART 3 DOCUMENTATION

3.1 RECORDS AND REPORTS

A. Prepare detailed reports of each test or inspection. Include the following general information:
1. Project name and number.
2. Date of test or inspection.
3. Name of Testing Agency or Inspecting Agency.
4. Name of technician or inspector.
5. Weather conditions.
6. Locations and elevations of specific areas tested or inspected referenced to grid lines.
7. Description of test or inspection.
8. Reference to applicable ASTM standard.
9. Summary of observations, results, and recommendations.
10. Description of areas or materials requiring retesting or reinspection.

B. Reports for each drilled pier shall contain the following information:
1. Elevation of bottom and top.
2. Centerline location at top.
3. Variation of shaft from plumb.
4. Elevation of top and bottom of casings left in place.
5. Volume of grout or concrete in each pier.
6. Condition of bearing strata and verification of review by RDP for Geotechnical Engineering.
7. Water seepage.

8. Unusual conditions.
9. Delays in placement of grout or concrete, and location of construction joints in shafts.
10. Dates of starting excavation or drilling, completion of excavation or drilling, inspections, and placement of concrete.

C. Concrete compressive strength test reports shall contain the following information:

1. Name of Contractor and concrete supplier.
2. Name of concrete testing service.
3. Name of technician making and testing specimens.
4. Truck number and delivery ticket number.
5. Date and location within structure of concrete placement.
6. Concrete type, class, mix proportions of materials, and design compressive strength at 28 days.
7. Slump, air content, unit weight, and concrete temperature.
8. Total time period between batching and completing placement for each truck.
9. Compressive strength and type of break for tests.

D. Field reports for concrete inspection shall contain general information noted above plus ambient temperature and cylinder numbers.

E. Test reports for masonry materials shall include proportions, composition, and compressive strength.

3.2 COMMUNICATION

A. Testing/Inspecting Agency shall immediately notify Contractor, Special Inspector, and Registered Design Professional by telephone, fax, or e-mail of test results failing to comply with requirements of Contract Documents.

B. Special Inspector shall immediately notify Contractor of work found to be in nonconformance with Contract Documents during inspections. If nonconforming work is not corrected while Special Inspector is on-site, Special Inspector shall notify Registered Design Professional within 24 hours (one business day) and issue an inspection report noting the non-conformance.

C. Special Inspector and each Testing/Inspecting Agent shall use a log to record and track non-conforming work during construction. Non-Conformance log shall include the following information:

1. Description of non-conformance.
2. Date of non-conformance.
3. Description of RDP response if received.
4. Status of nonconformance: ‘Open’ or ‘Closed.’

Updated log shall be attached to each inspection report. Special Inspector or Testing/Inspecting Agent may use Non-Conformance Log form provided at end of this section or other similar form.

D. If non-conforming work is not corrected at time of substantial completion of structure or other appropriate time, Special Inspector shall notify Code Enforcement Official.

3.3 DISTRIBUTION OF REPORTS

A. Testing/Inspecting Agency shall submit reports to Special Inspector and Registered Design Professional within 7 days of inspection or test. Legible handwritten reports may be submitted if final typed copies are not available.

B. Special Inspector shall distribute reports to the Contractor, Owner, Architect, Code Enforcement Official, and RDP for Structural Engineering within 7 days of inspections. Legible handwritten reports may be submitted if final typed copies are not available.

C. If requested by the Code Enforcement Official, Special Inspector shall submit interim reports that include inspections and tests performed since beginning of construction or since previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design

Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by Agent performing inspections.

3.4 FINAL REPORT OF SPECIAL INSPECTIONS

A. At completion of work, each Testing/Inspecting Agency shall submit Agent's Final Report of Special Inspections to Special Inspector stating work was completed in substantial conformance with Contract Documents and appropriate inspections and tests were performed. Testing/Inspecting Agency may use Agent's Final Report of Special Inspections form provided at end of this section or other similar form.

B. At completion of work, Special Inspector shall compile a Final Report of Special Inspections including each Agent's Final Report of Special Inspections. The Final Report of Special Inspections shall state required inspections have been performed and itemize nonconforming work not corrected or resolved as required by the NYSUC. Interim reports from all Agents will not be included unless specifically requested by the Owner or Code Enforcement Official. The Final Report shall be stamped by a New York State Professional Engineer.

C. Special Inspector may use Final Report of Special Inspections form provided at end of this section or other similar form based on CASE Form 102-2001.

D. Special Inspector shall submit Final Report of Special Inspections to Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.

AGENT X NON-CONFORMANCE LOG

PROJECT:

PROJECT NUMBER:

Non-Conformance Item No. (See Note 1)	**Special Inspection Report No. Reference/Date**	**Summary of Non-Conformance**	**Date of RDP Response Received**	**SI Reinspection Required**	**Date Contractor Verification Received** (See Note 1)	**Status** (See Note 2)
NC 1						
NC 2						
NC 3						
NC 4						
NC 5						
NC 6						

1. New items are in **bold**. For each non-conformance item above, the General Contractor or Subcontractor must sign and submit the Contractor Verification statement located in the RDP Response Report.

2. Non-conformance items remain "OPEN" until the Contractor Verification have been received. When the signed verifications have been received by the RDP, the item will be "CLOSED".

Testing/Inspection Agent's Final Report of Special Inspections

Project Name:_____ Inspection Agent: _____

Location:_____ Inspection Agent Project No.: _____

Owner:_____ Special Inspector: _____

Owner Address:_____ Structural RDP: _____

Ryan Biggs | Clark Davis Project No.: 11737

To the best of my information, knowledge, and belief, the Special Inspections and testing required for this project and designated for this Agent in the Statement of Special Inspections (which includes Specification Section 014533 and the Schedule of Special Inspections) have been performed and discovered discrepancies have been reported and resolved except for the following:

Comments:

[Attach continuation sheets if required to complete description of uncorrected discrepancies.]

Respectfully submitted,

Agent of the Special Inspector

[TITLE]

_____

(Type or print name)

_____

Signature Date

_____

Address

_____

City, State, Zip

Design Professional Seal or Certification

Final Report of Special Inspections

Project Name:_____ Special Inspector: _____

Location:_____ Special Inspector Project No.: _____

Owner:_____ Architect of Record: _____

Owner Address:_____ Structural RDP: _____

Ryan Biggs | Clark Davis Project No.: 11737

To the best of my information, knowledge, and belief, Special Inspections required for this project, as indicated in the Statement of Special Inspections, (which includes Specification Section 014533 and the Schedule of Special Inspections) have been performed and discovered discrepancies have been reported and resolved except for the following:

Comments:

[Attach continuation sheets if required to complete description of uncorrected discrepancies.]

Interim reports submitted prior to this Final Report form a basis for and are to be considered an integral part of this Final Report. Upon request, the interim Testing and Special Inspection reports can be provided. Agent's Final Reports of Special Inspections are attached and are also a part of this Final Report.

Respectfully submitted,

Special Inspector

[TITLE]

_____

(Type or print name)

_____

Signature Date

Professional Seal

END OF SECTION 01 4533

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Dewatering
B. Temporary utilities.
C. Temporary telecommunications services.
D. Water service and distribution.
E. Storm and sanitary sewer.
F. Temporary electric power and light.
G. Temporary heat.
H. Ventilation.
I. Temporary telephone service.
J. Temporary sanitary facilities.
K. Temporary Controls: Barriers, enclosures, and fencing.
L. Storage shed
M. Temporary enclosures.
N. Hoists and temporary existing elevator use (if any).
O. Waste removal facilities and services.
P. Construction aids and miscellaneous services and facilities.
Q. Sidewalk bridges and scaffolding.
R. Enclosure fence for the construction areas.
S. Environmental protection.
T. Snow Removal.
U. Street traffic control barriers.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements for submittals.
B. Section 01 3553 - Site Safety and Security Procedures
C. Section 01 5213 - Field Offices and Sheds.
D. Section 01 5500 - Vehicular Access and Parking.
E. Section 01 5510 - Traffic and Pedestrian Access & Control.
F. Section 01 5527 - Traffic Maintenance and Protection.
G. Section 01 5719 - Environmental Protection During Construction.
H. Section 01 5813 - Temporary Project Signage.
I. Section 01 7000 - Execution: Requirements for progress cleaning requirements.
J. Section 01 7419 - Construction Waste Management and Disposal.
K. Section 01 7600 - Procedures and Special Conditions for Separate Prime Contracts.

L. Divisions 2 through 40 temporary heat, ventilation, and humidity requirements for products in those Sections.

M. Division 31 Earthwork for disposal of ground water at Project site.

N. Division 32 Asphalt Paving for construction and maintenance of asphalt paving for temporary roads and paved areas.

O. Reference Drawing Logistics Plan for temporary parking, gravel, fencing and protection.

1.4 REFERENCE STANDARDS

A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.5 DEWATERING

A. Refer to Section 01 5721 - Indoor Air Quality Controls for additional requirements.

B. Provide temporary means and methods for dewatering all temporary facilities and controls.

1.6 DEFINITIONS

A. Permanent Enclosure: As determined by Construction Manager, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.7 REFERENCES

A. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Refer to guidelines for Bid Conditions for “Temporary Job Utilities and Services” as prepared jointly by AGC and ASC for recommendations.

1.8 SITE PLAN:

A. Show exiting fencing, temporary facilities , utility hookups, staging areas, and parking areas for construction personnel.

B. Refer to Site Logistics Plan.

1.9 REPORTS AND PERMITS:

A. During the progress of the Work, each prime contractor shall submit copies of reports and permits required by governing authorities, or necessary for the installation and efficient operation of temporary services and facilities.

B. Submit copies of reports of tests, inspections, and similar procedures performed on temporary utilities before, during and after performance of work. Submit copies of permits, easements and similar documentation necessary for installation, use and operation of temporary utility services.

1.10 QUALITY ASSURANCE

A. Regulations: Each contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
   1. Building code requirements.
   2. Health and safety regulations.
   3. Utility company regulations.
   4. Police, fire department and rescue squad rules.
   5. Environmental protection regulations

B. Standards: Each contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

C. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

D. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.11 PROJECT CONDITIONS

A. General: Each contractor shall provide each temporary service and facility ready for use at each location, when first needed to avoid delays in performance of work. Maintain, expand as required, and modify as needed throughout the progress of the work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

1. With the establishment of the job progress schedule, each contractor shall establish a schedule for implementation and termination of service for each temporary utility. At the earliest feasible time, and when acceptable to the Construction Manager, change over from use of temporary utility service to use of the permanent service, to enable removal of temporary utilities and to eliminate possible interference with completion of the Work.

B. Temporary Use of Permanent Facilities: Regardless of previously assigned responsibilities for temporary services and facilities, the Installer of each permanent service or facility shall assume responsibility for its operation, maintenance and protection during use as a construction service or facility prior to the Construction Manager's acceptance and operation of the facility.

C. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload, and do not permit temporary services and facilities to interfere with the progress of work, or occupancy of existing facility by owner. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

D. Temporary Utilities: Do not permit freezing of pipes, flooding or the contamination of water sources.

E. Temporary Construction and Support Facilities: Maintain temporary facilities in a manner to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary facilities in a sanitary manner so as to avoid health problems.

F. Security and Protection: Maintain site security and protection facilities in a safe, lawful, publicly acceptable manner. Take measures necessary to prevent site erosion.

1.12 TEMPORARY UTILITIES

A. Owner will provide, for the Contractor(s) use, the following:

1. Electrical power, consisting of connection to existing facilities.
2. Water supply, consisting of connection to existing facilities.

B. The responsible Contractor shall provide and pay for all electrical power, lighting, water, and ventilation required for construction purposes.

C. Existing facilities may be used.

D. New permanent facilities may be used when approved by the Construction Manager.

E. Use trigger-operated nozzles, with back flow devices, for water hoses, to avoid waste of water.

F. Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
    a. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose

1.13 DIVISION OF RESPONSIBILITIES

A. **Each contractor is responsible for the following:**

1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each facility.
2. Plug-in electric power cords and extension cords.
3. Supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
4. Special power requirements for installation of its own work such as welding or temporarry elevator power.
5. Its own field office complete with necessary furniture, utilities, and telephone service.
6. Its own storage and fabrication sheds.
7. Temporary heat, ventilation, humidity control, and enclosure of the building where these facilities are necessary for its construction activity but have not yet been installed by the responsible General Contractor
8. All hoisting and scaffolding for its own work.
9. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
10. Collection and disposal of major equipment removed such as boilers, unit ventilators , fans, toilet fixtures, and light fixtures.
11. Collection of general waste and debris and disposing into containers provided by Contract #1, General Construction Contractor.
12. Secure lockup of its own tools, materials and equipment.
13. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

1.14 GENERAL CONSTRUCTION CONTRACTOR CONTRACT #1

A. The General Construction Contractor is responsible and pays all costs for all contracts for the following: .

1. Temporary field offices for the Construction Manager.
2. Temporary roads and paving.
3. Temporary toilets and wash facilities, including disposable supplies.
4. Temporary daily janitorial services.
5. Temporary heat for new additions.
6. First Aid Station and Supplies.
7. Containers for non-hazardous waste and debris.
8. Temporary enclosure of the building.
9. Disposal of wastes containers.
10. Rodent and pest control.
11. Barricades, warning signs, and lights.
12. Site/construction enclosure fence.
13. Sidewalk bridge and fence.
14. Security enclosure and lockup.
15. Environmental protection.
16. Temporary Protection for existing flooring, from altered areas to exits.
17. Construction aids and miscellaneous services and facilities.
18. Temporary dustproof partitions.
19. Temporary dust control.
20. Dewatering facilities and drains.

21. Snow Removal.
22. Temporary heat (See paragraph 1.34)

1.15 PLUMBING CONTRACTOR CONTRACT #2

A. Water Service: The Plumbing Contractor Contract #2 shall provide and pay all costs to install distribution piping of sizes and pressures adequate for construction for all contracts. .
   1. Applicability: This paragraph applies to all renovation and new construction work areas for this Project.
   2. Obtain water service from the nearby water main of the local water authority, as permitted by the governing authority, or use owner's existing if adequate for temporary facilities.
   3. As soon as construction operations start provide water, extend service, the full height of the building to form a temporary water. Provide distribution piping for temporary water to each location of use. Provide one outlet for each level of construction spaced so that water can be reached with a 100 foot length of hose. Provide one 3/4" flexible rubber hose 100 feet long with an adjustable nozzle, at each outlet where work requiring water is in progress.
   4. Provide backflow devices on all devices and hoses etc. to prevent water from re-entering the potable system.
   5. Maintain hose connections and outlet valves in leak-proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from drip pans as it accumulates.
   6. Protection: Prevent water filled piping from freezing, by use of ground covers, insulation, by keeping drained, or electrical tape. Maintain distinct markers for underground lines. Protect from damage during excavation operations
   7. Maintaining existing domestic hot and cold water systems, sanitary and storm systems, fire protection systems within the existing building operational at all times for Owner ‘s occupancy and during construction.

1.16 HVAC CONTRACTOR CONTRACT #3.

A. The HVAC Contractor Contract #3 is responsible for maintaining existing heating system in service during the period between September 15 and June 15. HVAC Contractor shall provide all piping, valves, controls, etc., and labor and materials required to maintain operation of existing heating system where affected by the work. Refer to paragraph 1.33 and 1.34 for additional requirements.

1.17 ELECTRICAL CONTRACTOR CONTRACT #4

A. Temporary Electric Power Service: Electrical Contractor Contract #4 shall provide and pay all costs to provide a weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period for all contracts. **.**
   1. Applicability: This paragraph applies to all renovation and new construction work areas for this Project.
   2. The Electrical Contractor shall make arrangements with utility company for temporary and permanent services immediately after award of contract, where required.
   3. Connect temporary service to Owner's existing main in the manner directed by Construction Manager.
   4. Temporary or permanent services for temporarily or permanently installed building equipment such as sump pumps, boilers, cabinet heating and/ or cooling units and fans shall be furnished, installed, operated and maintained so that the said equipment may be operated for drainage and temporary heat when required and/or when so ordered by the Construction Manager
   5. Electrical Contractor shall maintain all parts of the electrical system temporary and permanent active and in-service at all times throughout the contract duration. All temporary lighting and power to be controlled by standard switches per code (outside of power panels) at no additional charge.

6. Temporary Service: Install service and grounding in compliance with the National Electric Code (NFPA 70). Include necessary meters, transformers, overload protected disconnect and main distribution switch gear. Comply with all NECA, NEMA and UL Standards.
7. Provide temporary service with an automatic ground-fault interrupter feature, activated from the circuits of the system.
8. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead. Rise vertically where wiring will be least exposed to damage from construction operations.
9. Contractor shall provide temporary generator power to maintain power to critical circuits during main electric service switch over. Critical circuits shall include fire alarm, emergency lighting, communication, information technology, etc.. Coordinate required circuits with owner. Contractor shall include required fuel for operation.
10. If the Owner's existing service is inadequate the Contractor shall make arrangements with the local utility company for temporary service and provide generators and temporary panels as necessary. Generators shall be located at the building exterior. Provide feeder cables, adequately sized, in accordance with NEC to feed temporary panels or existing sub-panels.
11. Provide metal conduit, tubing or armored cable for protection of temporary power wiring where exposed to possible damage during construction operations. where permitted by code, wiring of circuits not exceeding 110-120 Volt 20 Amp rating and wiring of lighting circuits may be non-metallic sheathed cable in areas where located overhead and exposed. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide metal enclosures or boxes for wiring devices.
12. Provide overload-protected disconnect switch as required by code.
13. For power hand tools and task lighting, provide temporary 4-gang outlets at each floor level, spaced so that a 100 foot extension cord can reach each work area. Provide separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit). GFCI protected.
14. Temporary electric power for Construction Manager field office.
    a. Refer to Section 01 5213 - Field Offices and Sheds.
15. Temporary power for sidewalk bridges.
16. Temporary power for corridors, stairways and other exit ways.

B. Temporary Lighting: Electrical Contractor Contract #4 shall provide and pay all costs to provide local switching of temporary lighting, spaced to allow lighting to be turned off in patterns to conserve energy, retain light suitable for work-in-progress, access traffic, security check and project lock-up to accommodate performance of work during the construction period for all contracts.
1. Provide not less than on 200-watt lamp per 400 sq. ft. of floor area, uniformly distributed, for general construction lighting, or illumination of a similar nature.
    a. In corridors and similar traffic areas provide one 100-watt incandescent lamp every 50 feet.
    b. In stairways and at ladder runs, provide one lamp per story, located to illuminate each landing and flight.
    c. Provide separate circuitry for corridors, stairways and other travel exits.
2. Operate corridors, stairways and other travel exits 24 hours per day 7 days per week on each level.
    a. Install and operate temporary lighting to fulfill security and protection requirements, without the necessity of operating the entire system
3. Temporary lighting for sidewalk bridges.
4. Temporary lighting, pole mounted, with directional lighting to adequately illuminate all staging staging areas and adjustable so that lighting does not illuminate directly toward existing adjacent residences or student spaces.
5. Temporary power for Owner trailer.
6. Temporary lighting for Fabric Structure.

C. Whenever an overhead floor or roof deck has been installed, install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every work area

D. Temporary light and power shall be provided 15 minutes before the normal scheduled daily start of any trade and 15 minutes after the normal schedule daily completion of the last trade, except where 24 hour operation is indicated.

1. Electrical Contractor shall maintain power and lighting during the normal work week during the hours established by Construction Manager whether or not they fall within established working hours.

1.18 MAXIMUM LOADS

A. General: Lighting and power loads connected to the temporary power distribution system shall be limited to the following maximum individual loads:

1.	Load	Type	Maximum Size
2.	120 volt	1-phase	1.5 KVA
3.	208 volt	1-phase	2.5 KVA
4.	208 volt	3-phase	5.0 KVA

B. General: The temporary power distribution system shall be sufficiently sized to provide temporary power as required within this section.

1.19 ELECTRIC WELDERS

A. Separate Power Sources Required: Power for electric welders and for other loads larger than the maximum allowable sizes shall be taken from portable power sources provided, paid for and operated by the Contractor or Sub-Contractor requiring the use of such equipment. Remove such power sources when no longer needed.

1.20 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to the Owner, Architect, and Construction Manager. The Owner, Architect, and Construction Manager will not accept a contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.

1. Water Service Use Charges: Water from the Owner’s existing water system may be used without metering, and without payment for use charges.
2. Electric Power Service Use Charges: Electric power from the Owner's existing system may be used without payment of use charges. Contractor and Sub-Contractors shall exercise measures to conserve energy usage.
    a. Use of owner electric for items not specific to project (e.g. heating construction shanties, etc.) will not be permitted.
3. All temporary lighting and power to be controlled by standard switches per code (outside of power panels) at no additional charge.
4. Temporary Utility Services: Where Owner's existing services is inadequate or would disrupt owners use of the existing facility, contractor shall provide utility services for the temporary use at the project site from the utility company, and pay all costs, including use charges.
5. The Electrical Contractor is responsible for providing adequate utility capacity at each stage of construction for temporary services required under its contract. Prior to availability of temporary utility services at the site, provide trucked-in services for start up of construction operations.
6. Contractor may elect to use alternative temporary services and facilities equivalent to those specified, subject to acceptance by the Construction Manager.

1.21 TELECOMMUNICATIONS SERVICES

A. Each contractor shall provide and pay for its own telephone service. Provide mobile phone service for all field superintendents and foreman.

B. At each telephone post established be each contractor, a list of important telephone numbers, including the following:
   1. Local police and fire department.
   2. Doctor.
   3. Ambulance service.
   4. Contractor's temporary and home office.
   5. Owner's Representative temporary and home office
   6. Architect's home office.
   7. Engineer's home office.
   8. Owner's home office.
   9. Principal subcontractors temporary and home office

1.22 TEMPORARY SANITARY FACILITIES

A. Responsibilities: The General Construction Contractor, Contract #1, is responsible for temporary sanitary facilities and their maintenance, including supplies, for all contractors.

B. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

C. Toilets: Use of the Owner's existing toilet facilities will not be permitted

D. Maintain daily in clean and sanitary condition.

E. At end of construction, return facilities to same or better condition as originally found.

F. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations which will best serve the project's needs.

G. Locate toilets so that no one within the construction area will need to walk more than 2 stories vertically or 200 feet horizontally to reach these facilities.

H. Install self-contained toilets to the extent permitted by governing regulations.

I. Supply and maintain toilet tissue, paper towels and other disposable materials as appropriate for each facility, for full contract duration. Provide covered waste containers for used material.

J. Provide separate toilet facilities for male and female construction personnel.

K. Janitorial Services: Provide janitorial services for Construction Manager's temporary offices, toilets, and similar areas. Require users of other temporary facilities to help maintain a clean and orderly premises.

1.23 BARRIERS

Responsibility: General construction barriers required for the project shall be the responsibility of the General Construction Contractor, Contract #1 for all contracts.

A. Barricades, Warning Signs and Lights: Comply with recognized standards and code requirements for erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where appropriate and needed for recognition of the facility, including flashing red lights where appropriate
   1. Sign Materials: For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated. Provide exterior grade acrylic-latex-base enamel for painting sign panels and applying graphics.

B. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and removals.

C. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

D. Plywood: For safety barriers, sidewalk bridges and similar direct-contact uses, provide exterior type, 5/8" thick minimum prime and finish painted plywood.

1.24 SIDEWALK BRIDGE

A. Sidewalk Bridge: General: Erect a substantial structurally adequate protective bridge for passage of persons along exits from existing building when overhead work is being performed. Coordinate with project entrance gates and other facilities and obstructions. Comply with governing regulations and requests of governing authorities

1. Responsibility: Sidewalk bridge required for the project shall be the responsibility of the General Construction Contractor Contract #1.
    a. Prior to start of construction construct sidewalk bridges where shown on drawings or when overhead work is being performed.
2. Construct sidewalk bridges using steel post and beams. Brace and securely attach all components.
    a. Sidewalk shall be designed for live load of 100 lbs/sf. and meet the following minimum requirements:
    b. Posts - 3 ½" standard pipe spaced 8' o.c. longitudinally.
    c. Beams -Structural steel dependent upon sidewalk width and live load.
    d. Joists -Structural steel or 3" x 6" to 4" x 8" timber, dependent upon joist spacing and live load.
    e. Decking - 2" to 3" thick planking, dependant upon joist framing and live load.
    f. Waterproofing - 22 gauge corrugated steel fastened below the decking.
    g. Parapet - ¼" plywood on 2" by 4" framing.
    h. Bracing - 1 ½" standard pipe for grits and railings, ¾ standard pipe or tube for X - bracing.
    i. Sills - 2" x 10" on the pavement or continuous 5" x 12" on soil.
    j. Fence - ¼" plywood.
    k. The bridge shall be braced longitudinally and horizontally with X-bracing every fifth bay and each end bay. Transverse bracing is provided 8' o.c. at post beam junctions. Connections shall be made with clamps.

B. Temporary Lighting:

1. Electrical Contractor shall provide temporary lighting for sidewalk bridges. Refer to paragraph 1.17.

C. Provide protection for plants designated to remain. Replace damaged plants.

1. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.25 FENCING

A. Enclosure Fence: General: Prior to start of excavation or other substantial elements of work begin, install a general enclosure fence with suitable lockable entrance gates. Locate where indicated, or if not indicated, enclose the entire site or the portion of the site determined to be sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except through entrance gates.

1. The General Construction Contractor, Contract #1, shall provide, maintain and pay all costs for temporary fencing for all contractors until directed to remove fence by the, Construction Manager from the site.
2. Refer to reference drawing Site Safety and Logistics Plan

B. Construction: Commercial grade chain link fence.

C. Provide 8 foot (- m) high fence around construction site; equip with vehicularand pedestrian gates with locks.

D. Locate where indicated, or if not indicated, enclosed portions of the site determined to be sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except through entrance gates.
   1. Material:
      a. Steel fencing: Galvanized Chain Link and galvanized gates (non-climbable size).
      b. Fabric: No.11GA galvanized, steel wire mesh, furnish one-piece fabric widths for fencing up to 12' in height indicated in the Contract Documents.
      c. Framing and Accessories: End, Corner and Pull posts: 2.375" OD steel pipe.
      d. Line Posts: Space 10'-0" O.C. maximum. 1.90" steel pipe or 1.875" x 1.625 C-sections.
      e. Fence Rails: Locate at top and bottom of fabric. Post brace assembly - manufacturer's standard.
      f. Wire ties: For tying fabric to line posts use wire ties spaced 12" O.C.
      g. Height: 8'
      h. Provide opaque fabric screening over fence mesh to obstruct view from and to the construction zone. Heavy duty knitted polyethylene 88% opaque to allow for air passage. (Color: green.) As manufactured by "Fence screen", Series 200 or approved equal.
   2. Excavate hole depths approximately 3" lower than post bottom; with bottom of posts set not less than 36" below finish grade surface. The line post holes will be 16" in diameter and 3'-9" in depth filled with set in a compacted mixture of gravel and earth.
      a. Self-supporting fence with movable bases may not be used except where the proposed temporary fence location is on top of existing paved surfaces.

1.26 EXTERIOR ENCLOSURES

A. Responsibilities: General Construction, Contract #1, is responsible for temporary enclosure .

B. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

C. At the earliest practical time provide temporary enclosure of materials, equipment, work in progress and completed portions of work to provide protection to the Work and employees from effects of exposure, foul weather, other construction operations, and similar activities on the site.

D. Provide temporary enclosures where temporary heat is needed and permanent building enclosure is not yet completed, and there is no other provision for containment of temporary heat. Coordinate enclosures with ventilating and material drying or curing requirements to avoid dangerous conditions and adverse effects.

E. Enclosure: Install tarpaulins or equivalent materials securely, using a minimum of metal framing, 4" - 20 ga. metal framing 16” o.c., and ½” plywood plus 6 mil poly for secure and weather tight protection of the school. Individual openings of 16-sq. ft. or less may be closed with plywood or similar materials.
   1. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures where work is being or will be performed, provide translucent tarpaulins made of nylon reinforced laminated polyethylene to admit the maximum amount of daylight and reduce the need for temporary lighting

F. Close openings through the floor or roof decks and other horizontal surfaces with substantial load-bearing metal framing or similar construction

1.27 INTERIOR ENCLOSURES

A. Refer to Section 02 2080 Asbestos Abatement for requirements in areas where asbestos/Lead or PCBs are being abated.

B. Provide temporary dustproof partitions as indicated or required to separate work areas from Port Chester-Rye UFSD-occupied areas, to prevent penetration of dust and moisture into Port Chester-Rye UFSD-occupied areas, and to prevent damage to existing materials and equipment.

C. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:

D. Paint surfaces exposed to view from Port Chester-Rye UFSD-occupied areas.

E. Temporary Dustproof Partitions: General Construction Contractor, Contract #1 shall provide dustproof partitions, for all contracts, to separate work area from occupied sections of building unless indicated otherwise. Partitions shall be full height metal stud surfaced with minimum 1/2" Type X gypsum board with 2 layers of poly sheeting, overlapped and edges caulked.
   1. Where isolated work is being performed by a prime contractor the contractor performing the work shall be responsible for protecting the occupied areas from the work areas as directed by the Architect, including providing dust protection.
   2. Vertical Openings: Close openings of 25 sq. ft. (2.3sq. M) or less with plywood or similar materials.
   3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
   4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
   5. Where temporary wood or plywood enclosure exceeds 100sq. Ft. (9.2 sq. m) in area, use fire-retardant-treated material for framing and main sheathing.

F. Electrical Contractor shall remove and reinstall any devices impacted by temporary partition installation. At conclusion of project electrician will again remove and reinstall these devices onto the permanent locations

G. Refer to Section 01 7330 - Selective Removals for additional requirements.

1.28 SITE SAFETY AND SECURITY PROCEDURES- See Section 01 3553

1.29 VEHICULAR ACCESS AND PARKING - See Section 01 5500

1.30 WASTE REMOVAL

A. See Section 01 7419 - Waste Management, for additional requirements.

B. General Construction Contractor, Contract #1, shall provide containers, at grade, to accommodate performance of work during the construction period for all contracts.
   1. Provide specific containers for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   2. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   3. Contractors shall not utilize the Owner's bins or dumpsters.

C. General Construction Contractor, Contract #1, shall broom clean the work area at the end of each work day.
   1. If the contractor fails to clean areas at the end of each work day the Construction Manager shall perform the cleaning and back charge the contractor accordingly. Contractors working after the normal work hours shall be responsible for their own clean up of any and all debris they generate after the General Construction Contractor has completed his daily clean up.

D. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

E. Provide containers with lids. Remove trash from site periodically.

F. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

G. Each prime contractor shall be responsible for daily cleaning up of spillage and debris resulting from its operations and from those of its subcontractors; and shall be responsible for complete removal and disposition of hazardous and toxic waste materials.
   1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

H. Burying or burning of waste materials on the site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. Provide rodent proof containers located on each floor level to encourage depositing of garbage and similar wastes by construction personnel.

J. Site: Each Contractor shall maintain Project site free of waste materials and debris.

K. Installed Work: Keep installed work clean. Each Contractor shall clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

L. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

M. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

N. General Construction, Contract #1 is responsibility for dust control for all contracts.

O. If daily cleaning and dust protection is not provided the Contractor will be back charged for cleanup performed by employees of the Owner or a separate contractor retained by the Owner.

1.31 TEMPORARY PROJECT SIGNS - See Section 01 5813

1.32 FIELD OFFICES - See Section 01 5213

1.33 TEMPORARY HEAT

A. Temporary Heat: General: Provide temporary heat as required for proper performance of the Work, curing or drying of recently installed work or protection of work in place from adverse effects of low temperatures or high humidity. Select facilities known to be safe and without deleterious effect upon work in place or being installed. Coordinate with ventilation requirements to produce indicated ambient condition required and to minimize consumption of fuel or energy.

1. All temporary heat required within the perimeter of the addition being erected, or within the completed or uncompleted walls of the building being erected, shall be the responsibility of the General Construction Contractor, Contract #1, and complete costs therefore shall be borne by them and included in the amount quoted in his proposal for all temporary heating described in this section.
2. All temporary heat required within the perimeter of the existing building shall be maintained by the HVAC, Contract #3 and costs therefore shall be borne by them and included in the amount quoted in his proposal for all temporary heating described in this section..
3. The General Construction Contractor Contract #1, shall enclose the area within the perimeter of the building, or the required portion of that area, with temporary, legal and fire-resistant construction which will retain temporary heat within that area, if the exterior walls are not erected. He shall do so when directed by the Construction Manager in order to comply with the progress schedule, and to protect work or materials previously placed, being placed, or about to be placed from damage that could result from cold weather.
4. All other contractors shall be responsible for temporary heat required to comply with the progress schedule and protect their work and materials on the site, but beyond the perimeter or beyond the completed or uncompleted walls of the building or buildings in this project.
5. When the building or a section thereof is enclosed, or when temporary heating is required for the proper progress or protection of the work as determined by the Construction Manager the General Construction Contractor shall provide and pay all cost for temporary heating.
6. Maintain a minimum temperature of 55 deg. F in permanently enclosed portions of the building and areas where finished work has been installed. Refer to individual sections for more stringent requirements.

7. Heating Facilities: Except where conditions make it necessary to use another system, provide properly vented self-contained LP gas heaters with individual space thermostatic control for temporary heat.
    a. Gasoline burning space heaters will not be permitted.
    b. Electric space heaters will not be permitted.
    c. Do not use open burning, electric or salamander type temporary heating units

B. Hoists and Temporary Elevator Use: .
1. Each Contractor shall provide facilities for hoisting materials and employees. Do not permit employees to ride hoists which comply only with requirements for hoisting materials. Section of type, size and number of facilities is the Contractor's option. Truck cranes and similar devices used for hoisting are considered tools and equipment and not temporary facilities
2. Elevator Use: Owner's existing elevator may not be used by the Contractor.

1.34 MISCELLANEOUS PROVISIONS

A. Temporary Roof Drainage: The General Construction Contractor, Contract #1, shall provide temporary drainage until roofing or similar waterproof deck construction is completed and prior to connection and operation of permanent drainage piping system
1. Dispose of rainwater in a lawful manner, which will not result in flooding of the project site or adjoining property, or endanger either permanent work or temporary facilities

B. Snow Removal: The General Construction Contractor, Contract #1, shall be responsible for the removal of snow from the contract area to included access roads, excavations, roof deck areas, roof areas, roof areas to provide access for roof curbs and equipment work, and exits from occupied areas to legal exitways for all contracts.
1. Provide salting / sanding as required to keep staging area and all walking areas safe for foot traffic.
2. Provide snow removal, salting, sanding at Construction Manager’s field office trailer and staging areas.

1.35 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection or when directed by the Construction Manager .

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

D. Restore new permanent facilities used during construction to specified condition.

E. Replace air filters and clean the inside of ductwork and housings.

F. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

G. Replace lamps in the lighting system that are burned out or dimmed by substantial hours of use

PART 2 PRODUCTS -

2.1 DE - WATERING FACILITIES AND DRAINS

A. The responsibility of de-watering of the site will be the responsibility of the General Contractor Contract #1. Coordinate with Construction Manager.

B. Comply with requirements in applicable Division 1 Sections for temporary drainage and de-watering facilities and operations not directly associated with construction activities included in individual sections. Where feasible, use same facilities. Maintain project site, excavations, and construction free of water.

C. Dispose of rainwater in a lawful manner that will not result in flooding project or adjoining property nor endanger permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.

D. Remove snow and ice as required to minimize accumulations

PART 3 EXECUTION -

3.1 TEMPORARY UTILITY INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.

B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

3.2 CONTRACTOR FIELD OFFICES Refer to Section 01 5213.

A. Maintain, in the contractors field office, all articles for First Aid treatment; further, the contractor shall establish standing arrangements for the immediate removal and hospital treatment of any employees and other persons on the job site who may be injured or who may become ill during the course work.

B. No interior work areas are to be used as office, storage or contractor staging.

3.3 STORAGE FACILITIES

A. Each Contractor and each subcontractor shall provide temporary storage shanties, tool houses and other facilities as required for his own use. Temporary structures shall be located at the fenced staging area, and shall be removed upon completion of the work or when directed.

B. Materials delivered to the site shall be safely stored and adequately protected against loss or damage. Particular care shall be taken to protect and cover materials that are liable to be damaged by the elements.

C. Due to limited on site storage space, each Contractor shall coordinate delivery of his materials with the Construction Manager who will determine when large deliveries shall be made and shall be designate storage locations on site for delivered materials. All stored materials must be stored in locked, watertight trailers, paid for by applicable contractor.

3.4 SCAFFOLDING AND STAGING

A. All scaffold, staging and appurtenances thereto shall comply in total to the requirements of Safety and Health Regulations for Construction Chapter XVII of OSHA, Part 1926 and all related amendments.

3.5 ROOF PROTECTION

A. All Contractors shall provide temporary protection on any newly installed or existing roof surface when it is necessary for work to take place on completed sections.

B. Upon such notification as required in subparagraph A, the Contractor shall assume responsibility for damages, if any, to the roofing system caused by the work of other trades, except that financial liability for any and all damages rests with the offending trade.

3.6 FIRE PREVENTION CONTROL

A. All Contractors shall comply with the safety provisions of the National Fire Protection Association's “National Fire Codes” pertaining to the work and, particularly, in connection with any cutting or welding performed as part of the work.

B. Refer to Section 01 3553 - Site Safety and Security Procedures for additional requirements.

3.7 DISCONTINUE, CHANGES AND REMOVAL

A. All Contractors shall:

1. Discontinue all temporary services required by the Contract when so directed by the Owner or the Architect.
2. The discontinuance of any such temporary service prior to the completion of the work shall not render the Owner liable for any additional cost entailed thereby and each Contractor shall thereafter furnish, at no additional cost to the Owner, any and all temporary service required by such Contractors work.

3. Remove and relocate such temporary facilities as directed by the Construction Manager or the Architect without additional cost to the Owner, and shall restore the site and the work to a condition satisfactory to the Owner.

3.8 VENTILATION AND HUMIDITY CONTROL FOR CONSTRUCTION

A. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

B. General Construction Contractor Contract #1 shall be responsible for temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity.

C. Ventilate enclosed area to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

D. Provide equipment as necessary for air and fresh exchange for the work area per OSHA standards.

E. Remove temporary ventilation equipment prior to the completion of construction.

F. General Construction Contractor Contract #1 will provide negative air machines of sufficient size / qty for square footage of work areas to exhaust any dust / fumes through flexible duct hose to exterior to eliminate any odors/smoke etc. During second shift work, there can be no odors in school the following day.

G. In Boiler Rooms, HVAC Contractor Contract #3, will provide negative air machines of sufficient size / qty for square footage of work areas to exhaust any dust / fumes through flexible duct hose to exterior to eliminate any odors/smoke etc. During second shift work, there can be no odors in school the following day.

H. Any contractor whom allows water infiltration into the building is responsible for cleanup and commercial dehumidifiers of sufficient size and quantity to prevent mold growth. Failure to immediately address will result in owner hiring others and back charging in order to insure safe school environment

3.9 VEHICLE ACCESS AND PARKING Refer to Section 01 5500

3.10 ENVIRONMENTAL PROTECTION:

A. Refer to Section 01 5721 - Indoor Air Quality Controls.

3.11 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

END OF SECTION

FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Temporary field offices for use of Construction Manager.

B. Temporary field offices for use of each Contractor.

C. Maintenance and removal.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts: Use of premises.

B. Section 01 5000 - Temporary Facilities and Controls:

1. Temporary telecommunications services for administrative purposes.
2. Temporary sanitary facilities required by law.

C. Section 01 5500: Parking and access to field offices.

1.4 USE OF EXISTING FACILITIES

A. Existing facilities shall not be used for field offices.

1.5 USE OF PERMANENT FACILITIES

A. Permanent facilities shall not be used for field offices.

PART 2 PRODUCTS

2.1 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.2 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove at completion of Work or when directed by the Construction Manager.

C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy requirements.

D. Exterior Materials: Weather resistant, finished in one color.

E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.

F. Lighting for Offices: 50 fc (538 lx) at desk top height, exterior lighting at entrance doors.

G. Fire Extinguishers: Appropriate type fire extinguisher at each office.

2.3 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.4 CONTRACTOR OFFICE AND FACILITIES

A. Each Contractor is responsible for all cost for their field offices.

B. Size: For Each Contractor's needs and to provide space for project meetings.

C. Telephone: As specified in Section 01 5000.

D. Other Furnishings: Each Contractor's option.

E. Equipment: Six adjustable band protective helmets for visitors, one 10 inch (250 mm) outdoor weather thermometer .

2.5 OWNER AND CM/ARCHITECT/ENGINEER OFFICE

A. The GC Contractor Contract #1 shall be responsible and pay all costs for Construction Manager's field office including:
   1. Electric use costs.
   2. Internet use cost.
   3. Plumbing water and sanitary system and maintenance.
   4. All furniture costs.
   5. Maintenance and cleaning cost.

B. Heating, Cooling, and Ventilating: Automatic central HVAC equipment to maintain comfort conditions.

C. Separate spaces for sole use of Construction Manager with two (2) separate entrance door with new lock and two keys.
   1. Five (5) rooms (4 Private offices).
   2. 1/2 Bath.
   3. Panel walls.
   4. Vinyl tile flooring.
   5. Gypsum ceiling.
   6. Light fixtures.

D. Area: At least 1344 sq ft (125 sq m), with minimum dimension of 24 ft (7.3 m).

E. Windows: At least eleven (11) windows, with minimum total area equivalent to 10 percent of floor area, with an operable sash and insect and security screens. Locate to provide views of construction area.

F. Electrical Distribution Panel: 100 amp breaker panel, Four (4) circuits minimum, 110 volt, 60 hz service.

G. Minimum fourteen (14) 110 volt duplex convenience outlets, two in each office and five in main room and one in toilet on each wall.

H. Four port internet router with data lines

I. Sanitary Facilities: Private plumbed lavatory toilet facilities. (1 Lav and 1 W.C.)
   1. Provide for water tank storage and waste disposal tank serving the toilet facility. Include regular replenishment of water, legal disposal of septic waste and regular servicing, janitorial services and toilet supplies.

J. Two (2) exterior doors with security screens and bars.

K. Two (2) OSHA compliant exterior stairs and platform

L. Vinyl skirting.

M. Delivery to site and complete installation.

N. Removal of and restoration at completion of Project when directed by the Construction Manager.

O. Furnishings:
   1. Four (4) desk 54 by 30 inch (1372 by 762 mm), with three drawers.
   2. One drafting table 36 by 72 inch (914 by 1829 mm), with one equipment drawer and a 48 inch wide parallel straight edge.
   3. One metal, double-door storage cabinet under table.
   4. Two (2) plan racks to hold working drawings, shop drawings, and record documents.
   5. One standard four-drawer legal size metal filing cabinet with locks and two keys per lock.
   6. Six linear ft (2 m) of metal bookshelves.
   7. Four (4) high back swivel arm chairs.
   8. One drafting table stool.

9. One tackboard 36 by 30 inch (914 by 762 mm).
10. Five (5) waste basket.
11. Conference Table: 8' folding with ten (10) folding chairs.
12. All support, foundations and miscellaneous support and installation items.

P. Trailer Manufacture:
1. Cassone Inc, Ronkonkama, NY. Model #: Cassone Model CA 2460, 1950 Lakeland Avenue, Ronkonkoma, N.Y. 11779; 631.585.7800.
2. Refer to Section 01 2500 - Substitution Procedures.

Q. The EC Electrical Contractor Contract #4 shall provide and pay all costs for installing:
1. Temporary electrical power and connection to electrical distribution 100 amp breaker panel, [4] circuits minimum, 110 volt, 60 hz will be provided by Trailer manufacturer.
2. Four (4) Data line from router provided by the General Contractor.

PART 3 EXECUTION

3.1 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.2 INSTALLATION

A. Install Construction Manager office spaces ready for occupancy 15 days after date fixed in Notice of Award.

B. Parking: Two hard surfaced parking spaces for use by Construction Manager connected to office by hard surfaced walk.

3.3 MAINTENANCE AND CLEANING

A. Weekly janitorial services, including supplies for Construction Manager's offices; periodic cleaning and maintenance for offices.

B. Maintain approach walks free of mud, water, and snow.

3.4 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Access roads.

B. Temporary roads and/or paving.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Flag persons.

G. Haul routes.

H. Traffic signs and signals.

I. Maintenance.

J. Removal, repair.

K. Mud from site vehicles.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts: For access to site, work sequence, and occupancy.

B. Section 01 5000 - Temporary Facilities and Controls.

C. Section 01 5813 - Temporary Project Signage: Post Mounted and Wall Mounted Traffic Control and Informational Signs.

D. Section 01 5719 - Environmental Protection During Construction.

E. Refer to Site Safety Plan for additional information.

PART 2 PRODUCTS

2.1 RESPONSIBILITY

A. General Construction, Contract #1 is responsibility for the requirements of this section for all contracts.

2.2 MATERIALS

A. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.3 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 5813 - Temporary Project Signage.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by Construction Manager or local jurisdictions.

PART 3 EXECUTION

3.1 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.2 ACCESS ROADS

A. Use of designated existing on-site streets and driveways for construction traffic is permitted as approved Construction Manager or local jurisdictions.

B. Tracked vehicles not allowed on paved areas.

C. General Contractor Contract #1shall construct and maintain temporary areas adequate to support loads and to withstand exposure to traffic during construction period.

1. Includes access for delivery through staging area to building work areas, and to equipment and storage areas and sheds. Maintenance of existing staging area to prevent / repair any ruts by grading with heavy equipment and placement of import ¾" stone for smooth, stable surface.
2. Provide dust-control treatment that is nonpolluting and contracting. Reapply treatment as required to minimize dust.
3. Temporary areas are installed and/or maintained by for access to all required areas of the sites.
4. Contractors will be permitted to utilize existing facility roads, as designated (as segregated by the Construction Manager and shown on drawings.
5. Road Cleaning: Maintain roads and walkways in an acceptably clean condition. This includes the removal of debris daily, if required, and/or a minimum of once a week due to all project traffic. Road cleaning equipment to be wet/vacuum type. The General Work Contractor (Contract #1) will clean roads for debris from building-related activities.
6. Snow Plowing: The General Contractor Contract #1 shall provide snow plowing of temporary road, parking areas, access route, and a 5' walkway to office trailer. Provide snow removal and salting of walkways to Construction Manager's office trailer. The school district will provide snow plowing of established routes.

D. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.

E. Staging Areas:

1. Staging areas as indicated on drawings will be provided by the Contractor and shall consist of the following: (Minimum Thickness: 4" or as required by soil conditions).
   a. Typed 4 Crushed stone base and conform to the requirements of Section 304 of NYS DOT Specifications. No recycled material of any kind is allowed on the project.
   b. Gradation shall conform to the following:

Sieve Size	Percent Passing by Weight
3 inch:	100
2 inch:	90-100
1/4 inch	30-65
No. 40	5-40
No. 200	0-10

F. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.

G. Location as indicated.

H. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.

I. Provide and maintain access to fire hydrants free of obstructions.

3.3 PARKING

A. Temporary parking by construction personnel shall be allowed only in areas so designated by the Construction Manager. Owner does not have space for construction parking in existing parking lots or roadways and will subsequently have vehicles in violation of parking prohibitions towed from site and back-charged with all fees to the contractor.

B. Use of new parking facilities by construction personnel is not permitted unless approved by the Construction Manager.

C. Locate as indicated.

3.4 PERMANENT PAVEMENTS AND PARKING FACILITIES

A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.5 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Port Chester-Rye UFSD's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

D. Traffic Regulations:

1. Access through Owner's entrances shall be limited.
2. Utilize only entrances/temporary roads as designated.
3. Maintain all District traffic regulations.
4. Construction parking will not be allowed adjacent to District buildings, additions or monuments.

3.6 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.7 HAUL ROUTES

A. Confine construction traffic to designated haul routes.

B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.8 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Refer to 01 5813 - Temporary Project Signage for additional requirements.

C. Relocate as work progresses, to maintain effective traffic control.

3.9 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.10 REMOVAL, REPAIR

A. Remove temporary roads when permanent paving is usable.

B. Remove underground work and compacted materials to a depth of 2 feet (600 mm); fill and grade site as specified.

C. Repair existing facilities damaged by use, to original condition.

D. Repair damage caused by installation.

3.11 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets. See drawings for details.

END OF SECTION

TRAFFIC AND PEDESTRIAN ACCESS & CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Each Contractor shall maintain traffic for the duration of the contract and protect the traveling public and pedestrians from all damage to persons and property within the limits of and for the duration of the contract; all in accordance with the plans and specifications.

B. It is specifically noted that while school is in session, there are student playing at recess, walking to outdoor gym classes, etc. Contractor's trucks must be walked from the project site to the main traffic loop and vice versa, with a separate monitoring individual to insure children's safety. See 01 1000 - Summary for delivery black out times.

C. Refer to Site Safety Plan for additional information.

1.3 METHOD OF MAINTAINING AND PROTECTING TRAF0FIC

A. Each Contractor shall maintain and protect traffic by so conducting his construction operations that the traveling public and pedestrian safety is subjected to a minimum of hazard and delay. In order to adequately maintain and protect traffic, contractor shall perform the following additional minimum requirements as directed by Owner's Representative:

1. Keep the surface of the traveled way free from mounds, depressions, and obstructions of any type which could present hazards or annoyance to traffic.
2. Keep the surface of all pavements used by the public free and clean of all dirt, debris, stone, timber or other obstructions to provide safe traveled ways.
3. Control dust and keep the traveled way free from materials spilled from hauling and construction equipment.
4. Provide all cones, barricades, signs and warning devices as may be required and/or as ordered by the Construction Manager to safely carry out the foregoing. All such signs and devices shall be fabricated and placed in accordance with the latest "FEDERAL MANUAL ON UNIFORM CONTROL DEVICES". USE OF OPEN FLARES IS PROHIBITED.
5. Prepare and submit for approval sketch/drawing showing proposed location and type of signs, barricades and devices as required in above.
6. Contractor shall cover with steel plates all open trenches at the close of each work day. Such plates to abut each other and be wedged at each end of trench to prevent plates from sliding open.
7. Contractor to post temporary construction signs, including construction traffic signs, safety signs, security signs, and no trespassing signs as required.

1.4 INGRESS AND EGRESS

A. Contractor shall provide and maintain at all times safe and adequate ingress and egress to and from site at existing or at new access points consistent with work, unless otherwise authorized by the Construction Manager.

1.5 CONTRACTOR'S ATTENTION IS DIRECTED TO

A. If, upon notification by Construction Manager, contractor fails to correct any unsatisfactory condition within 24 hours of being so directed, Construction Manager will immediately proceed with adequate forces to properly maintain the project and the entire cost of such maintenance shall be deducted (back charged) from any moneys due the contractor.

1.6 PAYMENT

A. The lump sum bid price for this item shall include the cost of furnishing all labor, material and equipment including the cost of any and all incidental required by job conditions as ordered by Construction Manager.

B. Withholding of Payment

1. No payment will be made under Maintenance and Protection of Traffic for each calendar day during which there are substantial deficiencies in compliance with the specification requirements of any subsection of this section, as determined by the Owner's Representative.
2. The amount of calendar day nonpayment will be determined by dividing the lump sum amount bid for Maintenance and Protection of Traffic by the number of calendar days between the date of the contractor commences work and the date of completion, as designated in the proposal, without regard to any extension of time.
3. In addition, for each calendar day or part thereof of any unsatisfactory work violating the required provisions of any subsection under Maintenance and Protection of Traffic, liquidated damages will be assessed at $100.00.
4. If Contractor fails to maintain and protect traffic adequately and safely for a period of 24 hours, the Construction Manager shall correct the adverse conditions by any means he deems appropriate, and shall deduct the cost of the corrective work from any Monies due the Contractor. The cost of this work shall be in addition to the liquidated damages and nonpayment for Maintenance and Protection of Traffic listed above.
5. However, where major non conformance with the requirements of this specification is noted by the Construction Manager and prompt contractor compliance is deemed not to be obtainable, all contract work may be stopped by direct order of the Owner's Representative regardless of whether corrections are made by the Construction Manager as stated in the paragraph above.

END OF SECTION

TRAFFIC MAINTENANCE AND PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. The Work of this Section shall be required in all areas within the project limits and consists of maintaining traffic and protecting the public from damage to persons and property that will be open to public vehicular traffic for the duration of this contract.

B. Maintain traffic over a reasonably smooth traveled way marked by signs, delineates, guiding devices and other acceptable methods in conformance with the New York State Manual of Uniform Traffic Control Devices (MUTCD).

C. Refer to Site Safety Plan for additional information.

1.3 RESPONSIBILITY

A. General Construction, Contract #1 is responsibility for the requirements of this section for all contracts.

B. Assume responsibility for conducting operations in a manner to insure the safety and convenience of all travelers and adjoining property owners within the limits of and for the duration of the contract.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with the requirements of DOT Section 700 Materials as they apply to the various materials required for the Work of this Section.

B. Provide sign panels of aluminum, galvanized steel or plywood with faces of reflective sheet material and non-reflective black characters conforming to DOT Section 730-13.

C. Provide delineates, barricades and lighting for construction barricades in accordance with the requirements of MUTCD. Where reflective materials are required, conform to DOT Section 730-05.02 except where glass or plastic buttons are used as delineates. Barricades, cones and drums may use reflective materials conforming to DOT Section 730-05.01

D. Provide pavement delineation of reflective paint or reflective pressure sensitive pavement marking tape. Line segments shall be a minimum of 4 inches wide and 36 inches long applied with the long axis of the segment parallel to the direction of traffic.

PART 3 EXECUTION

3.1 GENERAL

A. Remove construction equipment and materials from roadway during non-working hours or provide protection in such a manner that they will not constitute a traffic hazard.

B. Conduct and schedule the Work in a manner that will minimize the time during which the traveling public will be exposed to hazards.

C. Do not park employees personal vehicles within the work area in a manner that they will constitute a traffic hazard.

D. Provide a traveled way suitable for two lanes of moving traffic. Keep traveled way reasonably smooth and hard at all times.

E. Keep the traveled way of all public highways utilized for hauling materials to or from this project free of foreign objects that may fall or drop from transporting vehicles.

F. Correct dusty conditions resulting from the Work by the use of calcium chloride and/or water.

G. Distribute water uniformly by the use of suitable spray heads or spray bar. The Construction Manager will be the sole judge of the need for the application of water for dust control. Apply water at the intervals and locations ordered by the Construction Manager.

H. Whenever it becomes necessary to maintain traffic on one lane, provide adequate traffic controls on the Section of Roadway on which vehicle traffic is maintained. Provide competent flag persons or traffic signals at the location which will in the judgment of the Construction Manager adequately and continuously control one lane traffic.

I. Provide a sufficient number of competent flag persons in areas where construction operations are in potential conflict with public vehicular traffic. Flag person shall wear orange hats or caps and vests in conformance with MUTCD.

J. Maintain safe and adequate ingress and egress to and from intersecting highways, residences and commercial establishments.

K. The General Construction, Contract #1 is not responsible for removal of snow and ice from pavements or traveled ways open to public vehicular traffic.

L. Maintain existing and new drainage structures, culverts and ditches to adequately drain the traveled way.

M. Provide, maintain, move and remove delineation and guiding devices to properly delineate a safe and reasonable roadway. Delineate areas on which it is unsafe to travel.

N. Delineate dropoffs less than 6 inches by providing approved delineates at intervals of not more than 200 feet. Where the drop off is between 6 inches and 18 inches, the spacing between delineates shall not be more than 100 feet. Where the drop off is greater than 18 inches, a continuous delineation consisting of 2 inch or wider brightly colored flexible tape shall be used in addition to individual delineates provided they are properly painted and reflectorized in accordance with MUTCD.

1. Maintain existing highway signs, markers, delineates and their supports. Where necessary, relocate existing signs in conformance with MUTCD. Replace signs lost or damaged as a result of contract operations.

O. All excavations shall be backfilled in the same day. No trenches shall be left open overnight.

1. When steel plating over excavations is required, the plates shall be secured with sufficient spikes and blended into the existing pavement with either keyways or asphalt pavement.

3.2 CONSTRUCTION SIGNS

A. Refer to Section 01 5813 - Temporary Project Signage for additional requirements

B. Provide, maintain, move and remove reflectorized construction signs in accordance with the requirements of MUTCD.

C. Paint supports and backs of sign panels with two coats of white paint.

1. Mount construction signs a minimum of 5 feet above the surface of the traveled way.

3.3 CONSTRUCTION BARRICADES

A. Provide, maintain, move and remove lighted construction barricades in accordance with the requirements of MUTCD.

B. Provide flashing barricade lights of Type A, low intensity conforming to the requirements of Section 294.3 of MUTCD.

C. Hours of operation for barricade lights shall be from dusk to dawn.

3.4 PAVEMENT DELINEATION

A. Provide pavement delineation in accordance with MUTCD on any course of asphalt concrete upon which traffic will be maintained.

B. Apply pavement delineation before the end of the working day.

3.5 OPENING ROADWAY TO TRAFFIC PRIOR TO CONTRACT ACCEPTANCE

A. Maintain and protect traffic on any portion of pavement or structure ordered in writing by the Owner's Representative or as shown on the drawings to be opened to traffic prior to contract acceptance.

3.6 REMOVAL OF TRAFFIC CONTROL DEVICES

A. Promptly remove all delineates, signs, barricades and pavement workings when in the opinion of the Owner's Representative their presence constitutes a hazard or inconvenience to the traveling public.

B. Remove all remaining traffic control devices upon completion of the Work of this contract unless otherwise ordered in writing by the Owner's Representative.

END OF SECTION

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Contractor for General Construction Contract #1 shall provide all labor, materials, equipment and services to install all temporary erosion or ater pollution control measures as specified herein or as specified on the drawings:
   1. Site Preparation and Protection
   2. Earthwork
   3. Restoration

B. Temporary measures shall include silt fences, inlet protections, berms, sedimentation basins, silt screens, mulches, grasses, or other erosion control devices or methods as required.

C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply

1.3 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of Port Chester-Rye UFSD for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.4 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls.

B. Section 01 5500 - Vehicular Access and Parking.

C. Section 03 3000 - Cast-in-Place Concrete: Concrete for temporary and permanent erosion control structures indicated on drawings.

D. Refer to Division 31, 32 and 33

1.5 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.

B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2016.

F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017.

G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

H. All erosion control measures shall be as specified herein, or detailed on the drawings, and as described in the New York State guidelines for Urban Erosion and Sediment Control, and shall conform to the

standards of Westchester County Soil and Erosion Control Commission and to standards and details of the N.Y.S.D.E.C.

1.6 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.

B. Comply with all more stringent requirements of State of New York Erosion and Sedimentation Control Manual.

C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Port Chester-Rye UFSD.

G. Open Water: Prevent standing water that could become stagnant.

H. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
   1. Submit not less than 30 days prior to anticipated start of clearing, grading, or other work involving disturbance of ground surface cover.
   2. Include:
      a. Outline description of erosion and sediment containment program complete with implementation drawings, if requested.
      b. Material samples and product data as applicable to the particular products.
      c. Material safety data sheets on all products, as necessary.
   3. Obtain the approval of the Plan by School Construction Consultants.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

E. Silt fencing, straw bale sediment barrier, sediment basin or trap, stabilized construction entrance and dust control shall be as detailed in the N.Y.S. Manual.

F. Storm Drain Inlet Sediment Trap
   1. Gravel shall be clean sized ½”- ¾”.

1.8 OWNER'S AUTHORITY

A. The Construction Manager has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion or pollution control measures to minimize damage to property and contamination of watercourses and water impoundments.

1.9 COORDINATION AND SCHEDULING

A. Schedule the work so as to minimize the time that raw earth areas will be exposed to erosive conditions.

B. Coordinate the use of temporary controls with the permanent erosion control features or finish materials shown.

C. Incorporate permanent control features into the work at the earliest practical time.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sedimentation control system shall complete including silt fence, hardwood or metal posts, etc. as manufactured by:
   1. Marafi Inc/Carlisle – “Envirofence System"

B. Substitutions: 01 2500 - Substitution Procedures..

C. Erosion Control Mats: Knitted construction containing natural wood mulch similar and equal to that as manufactured by:
   1. Erosion Control Systems (1020-03).
   2. Synthetic Industries ("Polyjute").
   3. Substitutions: 01 2500 - Substitution Procedures..

D. Grass Seed: Seed mixture as specified in Section 32 9210 or other species suitable for temporary cover which will not compete with the grasses sown later for permanent cover.

E. Bales: Air dry, rectangular straw bales.
   1. Cross Section: 14 by 18 inches (350 by 450 mm), minimum.
   2. Bindings: Wire or string, around long dimension.

F. Bale Stakes: One of the following, minimum 3 feet (1 m) long:
   1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot (1.98 kg per linear m).
   2. Wood, 2 by 2 inches (50 by 50 mm) in cross section.

G. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491.
   3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   4. Tensile Strength: 100 pounds-force (450 N), minimum, in cross-machine direction; 124 pounds-force (550 N), minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
   6. Tear Strength: 55 pounds-force (245 N), minimum, when tested in accordance with ASTM D4533/D4533M.
   7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

H. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long:

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.2 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

B. The Construction Manager may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary or permanent erosion control measures

3.3 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 20 feet (7 m), minimum.
   2. Length: 50 feet (16 m), minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
   1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
   2. Straw bale row blocking entire inlet face area; anchor into pavement.

3.4 INSTALLATION

A. Silt Fences:
   1. Store and handle fabric in accordance with ASTM D4873/D4873M.
   2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch (405 mm) high barriers with minimum 36 inch (905 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 4 inches (100 mm) in ground.
   3. Install with top of fabric at nominal height and embedment as specified.
   4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with extra post.
   5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).

B. Straw Bale Rows:
   1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
   2. Install bales so that bindings are not in contact with the ground.
   3. Embed bales at least 2 inches (___ mm) in the ground.
   4. Anchor bales with at least two stakes per bale, driven at least 18 inches (450 mm) into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
   5. Fill gaps between ends of bales with loose straw wedged tightly.
   6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

3.5 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
   1. Promptly replace fabric that deteriorates unless need for fence has passed.
   2. Remove silt deposits that exceed one-third of the height of the fence.
   3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
   1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
   2. Remove silt deposits that exceed one-half of the height of the bales.
   3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Inlet traps and inlet protection devices shall have all sediment removed when the volume of storage is half full. Gravel filter shall be replaced following significant events and when flow begins by-passing structure.

G. Storm Water Quality Structure shall have sediment cleaned out of sedimentation chamber when it reaches more than 6 inches (6") in depth. Prior to final approval, all trash, sediment, and debris removed, and all silt/sediment shall be removed from filter beds.

H. Place sediment in appropriate locations on site; do not remove from site.

3.6 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Fuller and D'Angelo P.C..

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality during construction.

B. Testing air change effectiveness after completion of construction.

1.3 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

C. Ventilation: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1 with air change effectiveness of 0.9 or greater.

1.4 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Testing and inspection services.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

C. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC: Testing HVAC systems for proper air flow rates, adjustment of dampers and registers, and settings for equipment.

1.5 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017.

B. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; 2016.

C. ASHRAE Std 129 - Measuring Air-Change Effectiveness; 1997 (Reaffirmed 2002).

D. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.6 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
   1. Identify potential sources of odor and dust.

2. Identify construction activities likely to produce odor or dust.
3. Identify areas of project potentially affected, especially occupied areas.
4. Evaluate potential problems by severity and describe methods of control.
5. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
6. Describe cleaning and dust control procedures.

C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

D. Duct and Terminal Unit Inspection Report.

E. Ventilation Effectiveness Test Plan: Identify:
1. Testing agency qualifications.
2. Description of test spaces, including locations of air sampling.
3. Test procedures, in detail; state whether tracer gas decay or step-up will be used.
4. Test instruments and apparatus; identify tracer gas to be used.
5. Sampling methods.

F. Ventilation Effectiveness Test Reports: Show:
1. Include preliminary tests of instruments and apparatus and of test spaces.
2. Calculation of ventilation effectiveness, E.
3. Location where each sample was taken, and time.
4. Test values for each air sample.
5. HVAC operating conditions.
6. Other information specified in ASHRAE 129.
7. Other conditions or discrepancies that might have influenced results.

1.8 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 5 years experience in performing the types of testing specified.

PART 2 PRODUCTS

2.1 MATERIALS

A. Low VOC Materials: See Section 01 6116.

B. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
1. If work effects occupied portions of the facility perform work after hours or when building is unoccupied.

D. HVAC equipment and ductwork may NOT be used for ventilation during construction:
1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.

2. Exhaust directly to outside.
3. Seal HVAC air inlets and outlets immediately after duct installation.

E. Do not store construction materials or waste in mechanical or electrical rooms.

F. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
1. Inspect duct intakes, return air grilles, and terminal units for dust.
2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
3. Clean tops of doors and frames.
4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
5. Clean return plenums of air handling units.
6. Remove intake filters last, after cleaning is complete.

G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

H. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

3.2 VENTILATION EFFECTIVENESS TESTING

A. Perform ventilation effectiveness testing before occupancy.

B. Do not begin ventilation effectiveness testing until:
1. HVAC testing, adjusting, and balancing has been satisfactorily completed.
2. Building flush-out or air contaminant testing has been completed satisfactorily.
3. New HVAC filtration media have been installed.

C. Test each air handler zone in accordance with ASHRAE 129.

D. If calculated air change effectiveness for a particular zone is less than 0.9 due to inadequate balancing of the system, adjust, and retest at no cost to Port Chester-Rye UFSD.

END OF SECTION

TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Project identification sign.

B. Project informational signs.

C. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts.

B. Section 01 5000 - Temporary Facilities and Controls.

C. Section 32 1714 - Traffic Signs.

1.4 REFERENCE STANDARDS

A. New York State Department of Transportation.

B. Refer to the Sire Safety Plan for additional information.

1.5 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr (80 km/hr) wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.1 RESPONSIBILITY

A. General Construction, Contract #1 is responsibility for the requirements of this section for all contracts.

2.2 TRAFFIC SIGN MATERIALS

A. Structure and Framing: New, metal, structurally adequate.

B. Metal Signs shall be minimum 16 gauge steel.

C. Reflective sheeting shall conform to the requirements of the State of NY DOT.

D. Metal sign posts shall be 1-5/8" x 1-3/4" x 3-1/2", 8'-0" above grade.

E. Metal sign shall conform to the requirements of the State of NY DOT Standard Specifications.

F. Size shall be appropriate to message and in conformance to State of NY DOT.

G. Rough Hardware: Galvanized.

H. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

I. Lettering: Exterior quality paint, colors as selected.

2.3 PROJECT IDENTIFICATION SIGN

A. Project Identification Sign shall be the responsibility of General Contractor Contract #1.

B. One painted sign, 48 sq ft (4.5 sq m) area, bottom 6 feet (2 m) above ground.

C. Content:
   1. Project number, title, logo and name of Port Chester-Rye UFSD as indicated on Contract Documents.
   2. Names and titles of authorities.
   3. Names and titles of Owner's Representative, Architect, or Construction Manager and Consultants.
   4. Name of Prime Contractors .

D. Graphic Design, Colors, Style of Lettering: Designated by Architect .

2.4 PROJECT INFORMATIONAL SIGNS

A. Each Contractor shall provide identification signage at field office and storage trailers with contractor's name and telephone number.

B. General Contractor Contract #1 shall provide directional signs to direct traffic into and within site . Relocate as Work progress requires.

2.5 TEMPORARY SITE SAFETY AND DIRECTIONAL SIGNS:

A. Prepare temporary signs to provide directional information to construction personnel and visitors.

B. Construct signs of exterior type Grade AC plywood ½" thick. Support on posts or framing of preservative-treated wood or steel, or attach to fencing; do not attach signs to buildings or permanent construction.

C. Paint sign panel and applied graphics with exterior grade alkyd gloss enamel over exterior primer. Engage an experienced sign painter or fabricator to apply graphics.

D. Include relocating temporary site safety and directional signs as many times as required or directed.

E. Metal DOT / MUTCO compliant signage is acceptable where applicable.

F. The General Contractor Contract #1 shall furnish and install construction signage as required at each project site.
   1. For construction traffic control/flow at entrances/exits, as designated by the Owner (8 required)
   2. To direct visitors (4 required)
   3. For construction parking (4 required)
   4. To direct deliveries (4 required)
   5. Emergency egress only - Construction area (8 required)
   6. Per OSHA standards as necessary
   7. For "No Smoking" safe work site at multiple locations (6 required)

PART 3 EXECUTION

3.1 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

C. Install sign surface plumb and level, with butt joints. Anchor securely.

D. Paint exposed surfaces of sign, supports, and framing.

3.2 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.3 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of the project and restore the area.

END OF SECTION

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Substitution limitations.

E. Procedures for Port Chester-Rye UFSD-supplied products.

F. Maintenance materials, extra materials.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts.

B. Section 01 2500 - Substitution Procedures: Substitutions made after the Bidding/Negotiation Phase.

C. Section 01 4000 - Quality Requirements: Product quality monitoring.

D. Section 00 4401 - Qualification of Bidders.

E. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

F. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting packaging and substitutions.

1.4 REFERENCE STANDARDS

A. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services; 2017.

B. NEMA MG 1 - Motors and Generators; 2017.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.5 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. 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.

C. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

D. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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.

E. Substitutions: Changes in products, materials, equipment, and methods of construction from those required or specified by the Contract Documents and proposed by Contractor.

F. Basis-of-Design Or Equal Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," or "or equal", 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 other named manufacturers shall be submitted as substitutions.
   1. Refer to Section 01 2500 - Substitution Procedures.

G. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

1.6 SUBMITTALS

A. Refer to Section 01 3000 - Administrative Requirements for additional requirements

B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 10 days after date of Notice of Award.
   2. For products specified only by reference standards, list applicable reference standards.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.7 ASBESTOS

A. Asbestos: All products, materials, etc., used in conjunction with this Project shall be Asbestos-Free.
   1. Contractor shall provide a certified letter to the Owner stating that no asbestos containing material has been used in this project. Refer to Section 01 7800 - Closeout Submittals.

B. HVAC and sub contractors must provide test results upon completion from a New York State accredited testing lab certifying that all pipe insulation and joints on this project contain no asbestos.
   1. This certification shall be based on a sampling of 10% of all linear feet of pipe insulation, (unless manufacturer's certificate is submitted).

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Port Chester-Rye UFSD, or otherwise indicated as to remain the property of the Port Chester-Rye UFSD, become the property of the Contractor(s); remove from site.

2.2 NEW PRODUCTS

A. Provide new products for all unless otherwise specifically required or permitted by the Contract Documents.

B. DO NOT USE products having any of the following characteristics:
   1. Made outside the United States, its territories, Canada, or Mexico.
   2. Made using or containing CFC's or HCFC's.
   3. Made of wood from newly cut old growth timber.

4. Containing lead, cadmium, asbestos.

C. Where all other criteria are met, Contractor shall give preference to products that:
1. If used on interior, have lower emissions, as defined in Section 01 6116.
2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Have longer documented life span under normal use.
5. Result in less construction waste.
6. Are Cradle-to-Cradle Certified.
7. Have a published Environmental Product Declaration (EPD).
8. Have a published Health Product Declaration (HPD).
9. Have a published GreenScreen Chemical Hazard Analysis.

2.3 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
1. Deliver to Construction Manager; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

B. **Fuller and D'Angelo P.C. will consider requests for substitutions only within 30 days after date** Letter of Award**.**

C. Substitutions will not be considered during the bidding phase.

D. A request for substitution constitutes a representation that the bidder:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Port Chester-Rye UFSD.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Agrees to reimburse Architect, Owner, Engineer, and Construction Manager for review or redesign services associated with re-approval by authorities.

3.2 SUBSTITUTION SUBMITTAL PROCEDURE AFTER BIDDING PHASE

A. Refer to Section 01 2500 - Substitution Procedures.

B. Substitution Request Form: Use form provided in 01 2500 Substitution Procedures.

C. Submit in electronic PDF format one copy of request for substitution for consideration. Limit each request to one proposed substitution.

3.3 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

C. VOC restrictions for product categories listed below under "DEFINITIONS."

D. All products of each category that are installed in the project must comply; Port Chester-Rye UFSD's project goals do not allow for partial compliance.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

C. Section 07 9200 - Joint Sealants: Emissions-compliant sealants.

1.4 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Flooring.
   4. Products making up wall and ceiling assemblies.
   5. Thermal and acoustical insulation.
   6. Free-standing furniture.
   7. Exterior applied products (for Healthcare and Schools projects only).

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Wet-applied roofing and waterproofing.
   4. Other products when specifically stated in the specifications.
   5. Adhesives, sealants, and sealer coatings.
   6. Carpet.
   7. Resilient floor coverings.
   8. Wood flooring.
   9. Gypsum board.
   10. Acoustical ceilings and panels.
   11. Other products when specifically stated in the specifications.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.5 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).

C. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

F. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.

G. UL (GGG) - GREENGUARD Gold Certified Products; UL Environment; current listings at http://http://productguide.ulenvironment.com/QuickSearch.aspx.

H. GreenSeal GS-36 - Adhesives for Commercial Use; 2013.

I. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).

J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

K. SCS (CPD) - SCS Certified Products; Current Edition.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Evidence of Compliance: Submit for each different product in each applicable category.

C. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.7 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
   1. Wet-Applied Products: State amount applied in mass per surface area.
   2. Paints and Coatings: Test tinted products, not just tinting bases.
   3. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Joint Sealants: SCAQMD 1168 Rule.
   3. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).
   4. Wet-Applied Roofing and Waterproofing: Comply with requirements for paints and coatings.

C. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current GREENGUARD Children & Schools certification; www.greenguard.org.
      b. Current Carpet and Rug Institute Green Label Plus certification; www.carpet-rug.org.
      c. Current SCS Floorscore certification; www.scscertified.com.
      d. Current SCS Indoor Advantage Gold certification; www.scscertified.com.
      e. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manual/lem_table.htm.
      f. Current certification by any other agencies acceptable to CHPS.
      g. Report of laboratory testing performed in accordance with CHPS requirements for getting a product listed in the Low-Emitting Materials Product List; report must include laboratory's statement that the product meets the specified criteria.
   2. Product data submittals showing VOC content are NOT acceptable forms of evidence.

D. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.

E. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current GreenSeal Certification.

F. Paints and Coatings: Provide products having VOC content as specified in Section 09 9000.

G. Carpet and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current Green Label Plus Certification.
      b. Report of laboratory testing performed in accordance with requirements.

H. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 6813.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Port Chester-Rye UFSD reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Port Chester-Rye UFSD.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

PRODUCT STANDARDIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing product standardization.
   1. By Resolution of the Port Chester-Rye UFSD certain manufacturers and systems have been specified in the Contract Documents that must be provided and **SUBSTITUTIONS WILL NOT BE PERMITTED.**

B. GC General Construction Contract #1
   1. Section 08 7110 - Finish Hardware
      a. Locksets and keying devices shall be compatible with Best Access System.

C. MC Mechanical Contractor Contract#3
   1. Section 23 0230 Unit Ventilators
      a. Unit Ventilators shall be as manufactured by Magic Aire.
   2. Section 23 0460 Automatic Temperature Controls.
      a. Temperature Control Systems computer program and devices shall be Andover Corporation

D. EC Electrical Contractor Contract #4
   1. Section 26 0800 Addressable Fire Protective Signaling Systems
      a. The Addressable Fire Protective Signaling Systems shall be Edwards Systems Tecnology.

E. Related Sections include the following:
   1. Division 1 Section 01 3000 - Administrative Requirements for procedures for submitting and handling submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

MATRIX OF BUILDING SYSTEM RESPONSIBILITY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. This section describes the relationship and responsibilities of the Prime Contractors, suppliers, vendors, subcontractors and Owner.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts: Contract descriptions, description of alterations work, work by others, future work, occupancy conditions, use of site and premises, work sequence.

B. Section 01 2000 - Price and Payment Procedures: Applications for payment, Schedule of Values, modifications procedures, closeout procedures.

C. Section 01 2100 - Allowances: Cash and contingency allowances.

D. Section 01 2300 - Alternates: Descriptions of items, administrative requirements.

E. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

F. Section 01 6180 - Product Standardization for Products that must be incorporated in the project. Substitutions will not be permitted.

G. Section 01 7900 - Demonstration and Training: Detailed requirements.

H. Section 01 9100 - Commissioning Requirements.

1.4 PRICE AND PAYMENT PROCEDURES

A. Allowances: See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 RESPONSIBILITY

A. It is the Contactors responsibility to coordinate and obtain from the Owner all information neccessary to complete the work.

3.2 ATTACHMENTS

A. Matrix is attached to this section.

END OF SECTION

BARILE GALLAGHER & ASSOCIATES

CONSULTING ENGINEERS

Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
DATA			
Rough-in: Wiremold (finished area), conduit (unfinished area), conduit sleeve, junction box (wall and/or ceiling type), outlet box, floor box, poke-thru, cover plate with female bulk head, supports (NO Conduit drops in new walls, wired to outlet. For low voltage cable only).	EC	EC	
In wall combo boxes, cover plate, bulkheads (Jacks) for Data/Tele and AV	EC	EC	
Data Cat 6 Cable Support - J-Hooks, fire rated zip ties and ladders in data closet	EC	EC	
Data Cat 6 Cable - From Data Outlet & WAP to Patch Panel. Tag both ends of cable, type written address nomenclature at outlet and patch panel, Test cable as per Spec.	EC	EC	All Address will be furnished by Owner
Data cable color selection	PC DISTRICT	N/A	EC to refer to Color Chart by owner for all Cable Color Type
New Data rack/closets: new racks, ladders, patch panels and patch cords. EC shall furnish the following: Thirty (30) BLUE color and Forty (40) WHITE color of each length of patch cord as follows: 7'-0", 5'-0", 3'-0".	EC	EC	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
DATA (Continued)			
Fiber Cable - From IDF to MDF, including connectors, connection (termination), labelling and testing , OM3 (12 Strand 10 Gigabyte) 50um (aqua color) Fiber Cable - Specific cable type description shall be provided by BOCES)	EC	EC	
Device Address to be furnished by PC District to Electrical Contractor - EC to provide labels)	EC	EC	
Wireless Access Point Device (WAP) and configuration.	PC DISTRICT/BOCE	EC	
WAP installed in Gym, Choral Room and Band Room wiring shall be in Conduit.	PC DISTRICT	EC	
WAP Conduit and Wire	EC	EC	
Switches, servers, Relays UPS onto racks including installing patch cords from patch panel to switches. Patch Cords furnished by EC as indicated above.	BOCES	BOCES	
Provide PC's, Lap Tops, I-Pads, Chrome Carts	PC DISTRICT	PC DISTRICT	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities			
Work Description	**Furnished By**	**Installed By**	**Comments/Response**
DATA (Continued)			
Interface with District Network including and not limited to Programming, Integration, Commissioning of Hardware and Software. Include all licences.	BOCES	BOCES	
Patch and Paint at Existing area	EC	GC	
Patch and Paint at New area	GC	GC	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Telephone			
Rough-in: Wiremold, conduit, conduit sleeve, junction box, outlet box, floor box, poke-thru, cover plate with female bulk head, mini PBX, supports. NO Conduit drops in new walls, wired to outlet. For low voltage cable only).	EC	EC	EC to Coordinate with Verizon for Mini PBX.
Telephone Cat 6 Cable Support - J-Hooks, fire rated zip ties.	EC	EC	
Telephone Cat 6 Cable - From Telephone Outlet to Patch Panel. Tag both ends of cable, type written address nomenclature at outlet and patch panel, include patch panels, patch cords (Patch cord quantity listed under Data Section). Test cable as per Spec.	EC	EC	
Telephone cable color selection	PC DISTRICT	N/A	EC to refer to Color Chart by owner for all Cable Color Type
Telephone Head-end equipment	PC District / Verizon	PC District / Verizon	
standard Telephone Hand Set	PC DISTRICT	PC DISTRICT	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Telephone (Continued)			
Telephone Switches, servers, Relays UPS onto racks including jumper cable from patch panel to switches. Patch Cords furnished by EC as indicated in Data Section above.	PC DISTRICT	PC DISTRICT	
Switches or relays to interface with School Copper wire phone system	PC DISTRICT	PC DISTRICT	
Wiring/Conductivity and wiring/cable type to interface from Switch/Relay with School Cooper wire phone system (IDF Closet to new Mini PBX)	EC	EC	
Provide 25 pair telephone cable from new Mini PBX to Main PBX in Basement. This shall include termination on both ends, label, test for continuity and sound.	EC	EC	
New Elevator - Provide Cat. 6 to Mini PBX	EC	EC	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Audio / Visual			
Rough-in: Wiremold (finished area), conduit (unfinished area), conduit sleeve, junction box (wall and/or ceiling type), outlet box, floor box, poke-thru, cover plate with female bulk head, supports (NO Conduit drops in new walls, wired to outlet. For low voltage cable only.)	EC	EC	
Power -Audio / Visual Equipment	EC	EC	
Low Voltage Wiring (HDMI and Cat 6) - Classroom Audio / Visual Equipment from teachers Desk to Interactive Boards	EC	EC	
In wall combo boxes, cover plate, bulk heads for Data and HDMI, Booster for HDMI Cable over 50'-0".	EC	EC	
Interactive Boards including mounting bracket, Projectors, PC's, Lap Tops, I-Pads, Chrome Carts in classrooms.	PC DISTRICT	PC DISTRICT	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities			
Work Description	**Furnished By**	**Installed By**	**Comments/Response**
Audio / Visual(Continued)			
Stand-alone Sound System, Microphones, Recording Equipment, Devices, Low Voltage Wiring, supports, Programming, Commissioning, Training, Etc. Refer to Drawings for Locations.	EC	EC	Refer to Specificaton Section 11 6020 Audio Visual.
Projector mounting and Projector Screens.	GC	GC	Refer to Specificaton 11 5213 Projection screen.
In-wall blocking for equipment Support. EC to coordinate equipment with GC.	GC	GC	Blocking shall be coordinated with BOCES.

Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Camera's			
Rough-in: conduit sleeve, junction box (durable wall and/or ceiling type to support camera), supports, (NO Conduit drops in new walls, wired to outlet. For low voltage cable only.).	EC	EC	
Camera Pink Cat 6 Cable Support - J-Hooks, fire rated zip ties	EC	EC	
Camera Pink Cat 6 Cable - From Camera J-Box to Patch Panel. Provide 5'-0" pig tail @ each J-Box. Tag both ends of cable. Include patch panel and patch cords. Test cable as per Spec.	EC	EC	
Type written address specialty nomenclature at each Camera and patch panel	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Camera - Exterior Mounted wall brackets	Owner Assigned Security Vendor to EC	EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Camera, Camera mounting support inside and outside of building, any other parts and smarts. EC shall provide lifts to Owner Assigned Security Vendor to access exterior areas and within Gymnasium.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.

Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Camera's (Continued)			
Camera Lens Adjustment, Camera Adjustment, sequencing, commissioning, etc. EC shall provide lifts to Owner Assigned Security Vendor to access exterior areas and within Gymnasium.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Camera Switch, DVR, Server, Programming, integration, Licenses.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Interface and provide conductivity for Cameras to data system.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Setup the Cameras to be viewed on Monitors.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Interface and provide conductivity and programming to Rye Brook and Port Chester Police Departments.	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.

BARILE GALLAGHER & ASSOCIATES

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Door Access			
Conduit stub up and junction box (JB) at door for fob key, 120V Power for low voltage transformer/power supply at doors. (Leave 2' pigtail).	EC	EC	
Electric Strike with Door Hardware, Door contacts frame mounted.	GC	GC	
Existing Walls Chop Brick and/or Block to install JB	EC	EC	
New Walls - Chop Brick and/or Block to install JB	GC	GC	All wring in conduit by EC shall be concealled. No surface mounted wiremold or conduit allowed.
Pink Cable “Banana Peel back Cable” from Access Controller box to JB above door. EC will leave 5’-10’ pigtails and labels on both ends. Also include Cat. 6 Cable from Access Controller box to switch on data rack.	EC	EC	
Access Controller, Door Fob Reader, low voltage transformer/power supply mounted in JB above door, Fob programming and the like. Any other associated parts and smarts	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor to EC	Owner Assigned Security Vendor is Part of Allowance Refer to Spec. Section 01 21 00.
Power for Access Controller	EC	EC	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Fire Alarm System			
Rough-in: F.A. MC Cable, wiring, wiremold, conduit, conduit sleeve; J-box (wall and/or ceiling type), cover plate, supports. No Conduits in new walls.	EC	EC	
Fire Alarm Devices - Horn/Strobe, Speaker/Strobes, Strobes, Manual Pull station, smoke/heat detectors, duct detector, DGP, F.A.C.P. Expansion cards, relays, Annunciator, Carbon detectors, Gas Detectors, etc.	EC	EC	
Magnetic Door Holders	GC	GC	
The F.A.wiring for Magnetic Door Holders (MH). Include line voltage. Provide high power addressable control relays to interface with MH.	EC	EC	
Water Flow and Tamper Switch Equipment	Plumber	Plumber	
Water Floor and Tamper Switch Fire alarm relay monitoring & wiring	EC	EC	
F.A. Devices address labelling at each device	EC	EC	
Fire Alarm Floor Layout Plaque	EC	EC	

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Port Chester UFSD - High School: Matrix of Building System Responsibilities			
Work Description	**Furnished By**	**Installed By**	**Comments/Response**
Fire Alarm System (Continued)			
Fire Alarm Programming & Start-up	Onwer Assigned F.A. Vendor to EC	Onwer Assigned F.A. Vendor to EC	F.A. Vendor to coordinate with owner all room numbers/designation before the start of programming. Not on school Network central station connection.
Commissioning (Third Party)	Owner Third Party Commissioning Agent	Owner Third Party Commissioning Agent	Owner Assigned F.A. Vendor to EC and EC shall assist Third Party Commissioning Agent.

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
P.A. System and Clock			
Rough-in: Wiremold, conduit, conduit sleeve; J-box, outlet box, supports	EC	EC	
P.A. System Cable Support - J-Hooks, fire rated zip ties.	EC	EC	
New P.A. System Cable - From Classroom to Main P.A. Rack. Tag both ends of cable, Test cable as per Spec.	EC	EC	
P.A. System Speaker, Call-In, Volume Attenuator, power supplies, expansion cards,	EC	EC	
P.A. System Programming	EC with Vendor	EC with Vendor	
Provide cut out relay for stand-alone sound system	EC	EC	
Wireless Clock including headend.	EC	EC	
LIGHTING CONTROLS			
Lighting controls (Complete Installation included and not limited to wiring, conduit, supports, Programming, etc.)	EC	EC	
Commissioning (Third Party)	Owner Third Party Commissioning Agent	Owner Third Party Commissioning Agent	Electrical Contractor shall assist Third Party Commissioning Agent.

BARILE GALLAGHER & ASSOCIATES

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Port Chester UFSD - High School: Matrix of Building System Responsibilities

Work Description	Furnished By	Installed By	Comments/Response
Mechanical Equipment Controls			
All low voltage wiring and conduit in unfinished areas, line voltage circuit for mechanical equipment, installation, tie-ins, update programming for heating and Cooling to BMS system. Refer to Specification Section 23 00 00 for additional information.	HVAC Sub Controller Contractor	HVAC Sub Controller Contractor	
Commissioning (Third Party)	Owner Third Party Commissioning Agent	Owner Third Party Commissioning Agent	HVAC Sub Controller Contract and HVAC Contractor shall assist Third Party Commissioning Agent.
BOCES interfaces with District Network IP Address	HVAC Sub Controller Contractor	HVAC Sub Controller Contractor	
Network Drops to equipment's	HVAC Sub Controller Contractor	HVAC Sub Controller Contractor	

EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Inspections prior to start of work.

B. Examination, preparation, and general installation procedures.

C. Requirements for alterations work, including selective removals and asbestos/lead abatement.

D. Site scoping.

E. Construction layout.

F. Field engineering.

G. General installation of products.

H. Progress cleaning.

I. Protection of installed construction.

J. Correction of the Work.

K. Pre-installation meetings.

L. Removals and dust control.

M. Cutting and patching.

N. Land surveying services.

O. Surveying for laying out the work.

P. Dust control

Q. Cleaning and protection.

R. Final Cleaning.

S. Starting of systems and equipment.

T. Demonstration and instruction of Port Chester-Rye UFSD personnel.

U. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

V. General requirements for maintenance service.

1.3 RELATED REQUIREMENTS

A. Section 01 1000 - Summary of Contracts: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.

F. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

G. Section 01 3553 - Site Safety and Security Procedures

H. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties.

I. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

J. Section 01 9100 - Commissioning Requirements: Contractor's responsibilities in regard to commissioning.

K. Section 01 2100 - Allowances: Allowance for Right of Way survey.

L. Section 07 8400 - Firestopping.

M. Section 31 2301 - Excavation, Backfill and Compaction.

N. Section 32 1810 Erosion Control And Inspections of Sediment Controls.

O. Divisionn 33 Utilities for site utilities.

P. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

Q. Reference Drawing - Site Safety Plan.

1.4 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

B. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement; 2002.

C. SMACNA (SRM) Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.

D. State Plane Coordinate System for New York.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers and Construction Manager.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of all documents, sealed signed by the Land Surveyor, and stating that the work in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.
   4. Indicate any discrepancies from the contract documents on each required survey.

C. Certified Surveys: Submit two copies signed by land surveyor or professional engineer for each of the surveys required along with a digital copy.

D. Submit two copies signed by scoping firm indication of all piping locations.

E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

F. Cutting and Patching: Refer to Section 01 7310 - Cutting and Patching for requirements.

G. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.7 QUALIFICATIONS

A. Refer to Section 00 4401 - Qualifications of Bidders

B. Refer to individual sections for additional requirements.

C. For surveying work, employ a land surveyor registered in New York and acceptable to Architect or Construction Manager . Submit evidence of surveyor's Errors and Omissions insurance coverage in the

form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

D. For field engineering employ a professional engineer of the discipline required for specific service on Project, licensed in New York. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

E. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in New York. Refer to Section 31 4260 Excavation Support and Protection for additional requirements.

1.8 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Port Chester-Rye UFSD.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   2. Outdoors: Limit conduct of especially noisy exterior work to hours within the local Noise ordinances.
   3. Indoors: Limit conduct of especially noisy interior work to the hours of 4:30 Pm and 10:30 PM when school programs and activities will not be disrupted and approved by Construction Manager.

H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

1.9 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Port Chester-Rye UFSD occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Port Chester-Rye UFSD's activities.

H. General: Each Contractor includes general coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules and control of site utilization from the beginning of construction activity through project closeout and warranty periods .

I. Alterations: Where applicable, requirements of the contract documents apply to alteration work in the same manner as to new construction. Refer to drawings for specific requirements of alteration work. Primarily, alterations can be described as normal architectural, mechanical and electrical alterations. Contractors shall review phasing and scheduling of the work to understand that certain areas of work must be completed and occupied prior to start of other work. This is essential to the Owner in their ability to maintain the educational programs during construction.

1.10 CODES, PERMITS, FEES, ETC. Refer to Section 01 4100 Regalatory Requirements

1.11 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

A. Pursuant to NYS Labor Law §220-h - On all public work projects all laborers, workers and mechanics working on the site are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.

PART 2 PRODUCTS

2.1 MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 2500 - Substitution Procedures.

D. Barriers shall be constructed of sturdy lumber having a minimum size of 2 x 4.

1. Signs shall be made of sturdy plywood of 1/2" minimum thickness and shall be made to legible at a distance of 50 feet.

2.2 CERTIFIED SURVEYS

A. Survey work shall be the responsibility of Contract #1 General Construction Contractor.

B. Responsibility included all provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.

C. Provision of facilities and assistance necessary for Construction Manager to check lines and grade points placed by Contractor.

1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for allowances work have been completed and accepted by Construction Manager.

D. Certified Surveys:

1. Right of Way Survey: Contractor shall maintain the right of way survey performed under the cash allowance, along each public roadway boarding the school site. This is the school "property line".
   a. All marker, stakes etc. shall be maintained throughout the construction work.
   b. **Building layout shall not start until the right of way has been certified**.

2. Certified Surveys: Submit two copies along with digital copy signed by land surveyor or professional engineer for each the following surveys:
   a. Foundation Survey: After completion of foundations, as-built survey shall be submitted before continuing with the work.
   b. Anchor Bolt Survey: After installation of all column anchor bolts, as-built survey shall be submitted.
      a) Dimension(s) between centerline of column anchor bolts and edge of foundation wall and/or brick shelf.
         (a) **No steel erection shall proceed until all corrections are completed.**
   c. Steel Survey: After completion of steel erection, surveyor shall survey steel indicating:
      a) Actual elevations to top of steel, plumbness and alignment of all columns, beams and.
      b) Dimension(s) between centerline of steel and edge of foundation wall, lintels and/or brick shelf.
         (a) **No masonry work shall proceed until survey is submitted and corrections are made**.
   d. Final Survey: Before substantial completion, the Surveyor shall prepare a final property survey showing significant features (real property) that have resulted from construction of the project, including underground utilities, tanks and similar work install under all contract.
      a) Each prime contractor shall provide related information to the surveyor for the work installed under their contract. Include on the survey a certification, signed by the Surveyor, to the effect that the principal lines and levels of the project are accurately positioned as shown on the drawings.
      b) Show, where applicable, boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
      c) Final Survey: Submit electronic copy on flash drive showing the Work performed and record survey data.

2.3 SITE SCOPING

A. Site Scoping shall be the responsibility of the Contract #1 General Construction .

B. Call ProTek (718) 472-2304 or info@ProTekLocating.com, before beginning any excavation at least five (5) working days prior to the start of construction, and locate and identify all underground utilities etc.

C. Submit two copies signed by scoping firm indication of all piping locations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. Notify Construction Manager of any discrepancies immediately in writing before proceeding to lay out the work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.

B.

C. Prior to start of construction take photographs, video's or similar documentation as evidence of existing project conditions as follows:
   1. Interior views: Each room and areas of outside work area which could be construded as caused by the contractor.
   2. Exterior views: Each area of work and areas of outside work area which could be construded as caused by the contractor.

D. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

E. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

F. Examine and verify specific conditions described in individual specification sections.

G. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

H. Verify that utility services are available, of the correct characteristics, and in the correct locations.

I. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect and Construction Manager five (5) working days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of examination, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copies to Architect and Construction Manager, participants and those affected by decisions made.

3.4 LAYING OUT THE WORK

A. Professional land surveyor shall verify locations of survey control points prior to starting work. Refer to drawing PCHS-R200.

B. Coordinate field engineering services with Contractor's subcontractors, installers, suppliers, and other prime contractor(s) as appropriate.

C. Check the location, line and grade of every major element as the work progresses. Notify the Construction Manager when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Construction Manager concurrence of the remediation plan. Promptly notify Construction Manager of any discrepancies discovered.

D. Contractor shall locate and protect survey control and reference points.

E. Control datum for survey is that indicated on drawings.

F. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

G. Promptly report to Construction Manager the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

H. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Construction Manager.

I. Utilize recognized engineering survey practices.

J. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

K. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

L. Periodically verify layouts by same means.

M. Maintain a complete and accurate log of control and survey work as it progresses.

N. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

O. Land Surveying:
   1. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor's expense by a surveyor licensed in New York, and approved by the Construction Manager.

P. Construction Surveying:
   1. General: Perform surveying as applicable to specific items necessary for proper execution of work.
      a. Structure: Stake out structures, including elevations, and check prior to and during construction.
      b. Site Utilities: Stake out utility lines including elevations, and check prior to and during construction.
      c. Road: Stake out roadway elevations at 50 foot (15.24 m)50-foot intervals on tangent, and at 25 foot (7.62 m) intervals on curves.
      d. Cross-sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveys.
      e. Record Staking: Provide permanent stake at each blind flange and each utility cap is provided for future connections. Use stakes for record staking of material(s) acceptable to Construction Manager.
      f. Structural Frame: Upon completion, certify location and plumbness.
   2. Surveying to Determine Quantities for Payment.
      a. For each application for progress payment, perform such surveys and computations necessary to determine quantities of work performed or placed. Perform surveys necessary for Construction Manager to determine final quantities of work in place.
      b. Notify Construction Manager at least 24 hours before performing survey services for determining quantities. Unless waived in writing by Construction Manager, perform quantity surveys in presence of Construction Manager.
   3. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used.
   4. Use by the Construction Manager: The Construction Manager may at any time use line and grade points and markers established by the Contractor. The Contractor's surveys are a part of the work and may be checked by the Construction Manager at any time.
   5. Accuracy:

a. Establish Contractor's temporary survey references points for Contractor's use to at least second-order accuracy (e.g., 1:10000). Set construction staking used as a guide for the work to at least third-order accuracy (e.g., 1:5000). Provide the absolute margin for error specified below on the basis established by such orders.
   a) Horizontal accuracy of easement staking: Plus or minus 0.1 feet (30.5 mm).
   b) Accuracy of other staking shall be plus or minus 0.04 feet (12.2 mm) horizontally and plus or minus 0.02 feet (6.1 mm) vertically.
   c) Include an error analysis sufficient to demonstrate required accuracy in survey calculations.

6. Construction Manager reserves the right to check the Contractor's survey, measurements, and calculations. The requirement for accuracy will not be waived, whether this right is exercised or not.

3.5 REMOVAL AND DUST CONTROL

A. The following procedures shall be followed when removals will create dust:
   1. Asbestos and lead containing material shall be removed as per asbestos and lead abatement sections of the specifications.
   2. Exterior
      a. Work must be in compliance with OSHA Construction Standard (29 CFR 1926.62).
      b. Windows directly below, above and adjacent to the work area shall be closed.
      c. Provide tarps on the outside of the building to catch all dust, debris and paint chips when items are being removed and installed.
   3. Interior:
      a. Floor surfaces shall be provided with a minimum of one layer of six mil plastic.
      b. All air vents in the room shall be closed, shut off and sealed.
      c. Access to all rooms undergoing removals shall be restricted to prevent unauthorized entry.
      d. All TV's, smart boards, furniture, books and clocks, moveable objects will be removed by the Owner. Items to remain, floors and fixed furniture, etc. shall cover with a six mil plastic by the General Construction Contractor Contract #1.
      e. Owner shall reinstall objects to their original location.
      f. All corridors from renovated areas to exitways, used by Contractors, shall be mopped and left clean daily by the General Construction Contractor Contract #1.
   4. General Construction Contractor Contract #1 shall provide labor for daily cleanup on the interior and the exterior of the building as required or directed by the Construction Manager. Any visible debris shall be removed prior to occupancy the following day.
      a. Only wet cleaning methods and/or HEPA vacuuming shall be used to clean.
   5. All debris shall be disposed of properly in accordance with Federal, State and Local Regulations. Refer to Section 01 5000 - Temporary Facilities and Controls and asbestos and lead abatement sections for containers required.
   6. Do not leave any openings unprotected at end of work day or during periods of excessive cold weather or precipitation.
   7. At completion of each work area HEPA vacuumed and wet wiped.

3.6 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Saw cut all concrete slabs and asphalt paving.

E. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

F. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

G. Make neat transitions between different surfaces, maintaining texture and appearance.

3.7 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Owner's Representative before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   3. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, and Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Identify new equipment installed, but not in service, with appropriate signage or other forms of identification. indicating "Not in Service".
      b. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      c. Provide temporary connections as required to maintain existing systems in service.
      d. Perform all switchovers, shutdowns, etc after hours, weekends, holidays or times when the building is not occupied. All switchover scheduling shall be approved by the Owner.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove conduits, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
2. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Fuller and D'Angelo P.C. review and request instructions.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.8 CUTTING AND PATCHING

A. Refer to Section 01 7310 - Cutting and Patching.

3.9 SPECIAL REQUIREMENTS

A. All existing systems are required and shall remain operational during the performance of the work.

B. Notwithstanding anything contained in the Contract Documents to the contrary, the Contractor(s) shall not be permitted to disrupt operation of any building system or any of the services without Construction Manager's prior written consent, which shall not be unreasonably withheld. Any request to perform such work shall be in writing, received by Construction Manager no less than five (5) working days prior to the commencement of the request for disruption, and shall detail:
1. The exact nature and duration of such interruption;
2. The area of the Building affected, and;
3. Any impact upon the Construction Schedule caused by such proposed temporary disruption. All Work shall be performed during the hours and on the days set forth in the Specifications.

3.10 MISCELLANEOUS PROVISIONS:

A. Except as otherwise indicated comply with applicable requirements of Division-22, 23, and 26 sections for mechanical provisions within units of general Divisions 2-14, 31,-33 work. Except as otherwise indicated, comply with applicable requirements of Division-22-26 sections for electrical provisions within units of general (Divisions 2-14) work.

B. Service Connections: Refer to Division-22, 23 and 26 sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilization of available services, as indicated. Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.

3.11 FIRE PREVENTION AND CONTROL Refer to Section 01 3553

3.12 UNDERGROUND UTILITIES

A. Broken utilities from work are the responsibility of the Contractor performing the work. Use extreme caution when uncovering utilities. If a utility is broken while uncovering because the utility was not in the exact location identified, the cost of repair is the responsibility of the Contractor.
1. Refer to paragraphs pertaining to scoping.

3.13 WATCHMAN

A. The Owner will not provide watchman. Each Contractor will be held responsible for loss or injury to persons or property or work where his work is involved and shall provide such watchman and take such precautionary measures as he may deem necessary to protect his own interests.

3.14 SECURITY SYSTEM Refer to 01 3553 - Security Procedures

3.15 VERIFICATION OF CONDITIONS

A. All openings, measurements, door frames, existing conditions and other similar items or conditions shall be field measured prior to submission of any shop drawings or manufacturers literature for approval.

1. Each Contractor shall investigate each space into and through which equipment must be moved. Equipment shall be shipped from manufacturer in sections, of size suitable for moving through restricted spaces. Where sectional fabrication and or delivery cannot be achieved, openings, enlargements etc shall be provided by each contractor whose equipment requires access, at no additional cost to the Owner.

3.16 SALVAGEABLE MATERIALS:

A. The Owner will prepare a list of salvageable items it wishes to retain. All salvageable items shall be delivered by the Contractor to a storage area designated by the Construction Manager on site. All demolished equipment etc., except those items specifically requested by the Construction Manager shall become the Contractor's property and shall be removed from the premises.

3.17 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

E. Each Prime Contractor is responsible for their own daily debris removal into containers provided by the General Construction Contractor. Working areas are to be broom swept on a daily basis by the General Construction Contractor.

F. If daily cleaning and dust protection is not provided the Contractor will be back charged for cleanup performed by employees of the Owner or a separate contractor retained by the Owner.

3.18 PROTECTION OF INSTALLED WORK

A. Each Prime Contractor is responsible to provide protection for their work.

B. Protect installed work from damage by construction operations.

C. Provide special protection where specified in individual specification sections.

D. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

F. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

G. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

1. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

H. Prohibit traffic from landscaped areas.

I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.19 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Construction Manager seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.20 DEMONSTRATION AND INSTRUCTION

A. See Section 01 7900 - Demonstration and Training.

3.21 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, balancing and Adjusting HVAC. See Division 23.

3.22 FINAL CLEANING

A. Final cleaning shall be the responsibility of Contract #1 General Construction for contracts 1, 2, 3 and 4, and all costs for final cleaning shall be included in their Base Bid. Final cleaning responsibility shall be limited to all new additions and areas where renovations occur.

B. Execute final cleaning prior to final project assessment.

1. Clean areas to be occupied by Port Chester-Rye UFSD prior to final completion before Port Chester-Rye UFSD occupancy.

C. Use cleaning materials that are nonhazardous.

D. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

E. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

F. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

G. Clean filters of operating equipment.

H. Clean debris from roofs, gutters, downspouts, overflow drains, area drains, and drainage systems.

I. Clean site; sweep paved areas, rake clean landscaped surfaces.

J. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

K. Areas being altered or renovated by each prime only for their work shall be cleaned by the Contractor working in the area. Example: Intercom system or fire alarm system being replaced in classrooms or areas not being altered; unit ventilators, convectors, controls, etc. being replaced altered, etc., plumbing fixtures installed in classrooms not being altered.

L. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

M. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

N. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

O. Remove tools, construction equipment, machinery, and surplus material from Project site.

P. Remove snow and ice to provide safe access to building.

Q. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

R. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

S. Sweep concrete floors broom clean in unoccupied spaces.

T. Remove labels that are not permanent.

U. Touch up and otherwise repair and restore marred, exposed finishes and surfaces evidence of repair or restoration. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show

V. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

W. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

X. Replace parts subject to unusual operating conditions.

Y. Clean ducts, blowers, and coils if units were operated without filters during construction.

Z. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

AA. Leave Project clean and ready for occupancy.

AB. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.23 CLOSEOUT PROCEDURES Refer to Section 01 7800

END OF SECTION

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. This Section includes procedural requirements for cutting and patching.

1. Refer to other Sections for specific requirements and limitations applicable to cutting and patching.
2. Requirements of this Section apply to all contracts. Refer to various sections and divisions of these specifications for other requirements and limitations applicable to cutting and patching.
3. Contractor acknowledges that the work involves renovation and alteration of existing improvements and, therefore, cutting and patching of the work is essential for the Project to be successfully completed. Each Contractor shall perform any cutting, altering, patching and fitting of the work necessary for the work and the existing improvements to be fully integrated and to present the visual appearance of an entire, completed, and unified project. In performing any work which requires cutting, fixing, or patching, Contractor shall use its best efforts to protect and preserve the visual appearance and aesthetics of the project to the reasonable satisfaction of both the Owner and the Architect.
4. Each Contractor shall do all cutting, patching, repairing as necessary for their work In all cases, the cutting, patching, repairing and finishing shall be performed by mechanics skilled in the particular trade required at no additional cost to the Owner.

1.3 RELATED SECTIONS

A. Division 1 Section "Selective Removals" for removals of selected portions of the building for alterations.

B. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.

C. Divisions 2 through 14 Sections for additional requirements and limitations applicable to cutting and patching individual parts of the Work.

D. Requirements in this Section apply to each contractor and installations. Refer to all Division Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.4 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.5 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching; show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.

5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.6 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
1. Primary operational systems and equipment.
a. Air or smoke barriers.
b. Fire-protection systems.
c. Control systems.
d. Communication systems.
e. Conveying systems.
f. Electrical wiring systems.
g. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
a. Membranes and flashings.
b. Exterior curtain-wall construction.
c. Equipment supports.
d. Piping, ductwork, vessels, and equipment.
e. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

B. Prior to cutting and patching verify with Construction Manager all existing warranties in effect.
1. Portions of the exist roofs are under warranty. Work must be reviewed and approved by the manufacturer of the warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

B. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

B. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition. A sufficient time in advance of the construction of new walls, floors, pavement, or roofing etc. Each Contractor shall be responsible for properly locating and providing in place all sleeves, inserts and forms required for work.

C. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete/Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

D. All cutting of holes in existing walls, existing floors, existing roofs, existing ceilings, etc. for the removal of any existing work (including, but not limited to ducts, fans, fixtures, motors, equipment, drains, wiring, conduit, etc.) or for the installation of any new work shall be done in a neat manner by each Contractor. Debris caused by such cutting or removals will be removed by each Contractor.

E. Where sleeves, inserts or openings are required in existing walls, floors, roofs, vaults and pavements of existing buildings or structures, all necessary cutting, furnishing and installing of sleeves, inserts, lintels, etc., shall be done by each Contractor.

F. Contractor(s) are hereby notified that the existing walls in the existing building are concrete mansory unit. All openings in existing walls shall be provided with steel lintels, minimum 4" bearing each side and 8" wide x wall thickness concrete masonry units filled solid on each side of the opening for proper support.

G. Adequate blocking, fastening, etc., required to support equipment, casework, etc., from existing terra cotta walls shall be included as required to complete work.

H. All surfaces where existing items are removed from existing walls, floors, ceilings, roofs, vaults, etc. shall be patched to match existing surfaces.

1. All patching shall be provided with prime and finish paint or other material to match existing. In areas indicated to be completely painted/finished by the Contractor for Construction , other prime contractors shall be required only to patch existing surfaces to match as required to accept new finishes.
2. Proceed with patching after construction operations requiring cutting are complete.

I. Removals of selected portions of the building for alterations is included in Section "Selective Removals".

J. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION

SELECTIVE REMOVALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 RELATED DOCUMENTS

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

1.3 DESCRIPTION OF WORK:

A. Location of selective removal work is indicated on drawings only in a general manner and it is not all inclusive in the overall scope of removal work. Each Contractor shall provide all inclusive removals required for new and renovated work.
   1. Each Contractor will be responsible for all related removals and re-work of the existing systems, as required for new work.

1.4 SUMMARY

A. This Section includes but is not limited to the following:
   1. Removals of selected portions of a building or structure.
   2. Removal of selected site elements.
   3. Repair procedures for selective removals operations.

B. GC - Contract #1 including but not limited to:
   1. Removal of asbestos containing material where indicated.
   2. Removal of PCB containing caulking.
   3. Removal of portions of existing building indicated on drawings and as required to accommodate new construction.
   4. Removal of concrete floors, walls, and masonry etc. indicated to be removed or required for new construction.
      a. Note: Excavation, backfill, concrete slab etc. in basement of the existing building shall be performed by each contractor. Refer to Special Notes for each contractor in Section 01 1000 Summary of Contracts.
   5. Removal of existing roofing.
   6. Removal of existing windows.
   7. Cutting of new openings where indicated and /or required to accommodate new work.
   8. Patching of all areas of cutting and removals.
   9. Firestopping as specified in Section 07 8400 - Firestopping.
   10. Removals of roofing system and flashing.
   11. Firestopping as specified in Section 07 8400 - Firestopping.
   12. Cutting and patching as Specified in Section 01 7310 - Cutting and Patching.

C. Contract #2 Plumbing, Contract #3 HVAC, and Contract #4 Electrical Contractor including but not limited to:
   1. Refer to Divisions 22, 23, and 26 for additional selective removals required by each respective mechanical and electrical contractor.
   2. Cutting concrete floors excavation, backfill, concrete slab etc. in basement of the existing building shall be performed by each contractor. Refer to Special Notes for each contractor in Section 01 1000 Summary of Contracts.
      a.
   3. Removal of existing equipment piping, ducts, and conduits.

4. Cutting of new openings where indicated and /or required to accommodate new work.
5. Cutting, and removals required for installation of new HVAC, plumbing, and electrical.
6. Relocation of pipes, conduits, ducts, and other mechanical and electrical work.
7. Patching of all areas of cutting and removals.
8. Firestopping as specified in Section 07 8400 - Firestopping.
9. Cutting and patching as Specified in Section01 7310.

1.5 RELATED SECTIONS:

A. Section 01 1000 - Summary of Contracts for use of the premises and phasing requirements.

B. Section 01 3000 - Administrative Requirements: For preconstruction and progress photographs.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.

F. Section 01 5721 - Indoor Air Quality Controls.

G. Section 01 7310 - Cutting and Patching for cutting and patching procedures for selective removals operations.

H. Section 01 7600 - Procedures and Special Conditions for Separate Prime Contracts: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

I. Section 03 3000.

J. Section 07 8400 - Firestopping.

K. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

L. Division 22, 23, and 26 Sections for demolishing, cutting, patching, or relocating mechanical items.

M. Section 31 2301 - Excavation, Backfill and compaction.

1.6 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 Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
   1. Protect construction indicated to remain against damage and soiling during selective removals.

D. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

E. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective removals remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.7 SUBMITTALS

A. Refer to Section 01 3000 - Administrative Requirements for submittal procedures.

B. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

C. Schedule of selective removals Activities: Indicate the following:
   1. Detailed sequence of selective removals and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Locations of temporary partitions and means of egress.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Pre demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective removals operations. Submit before Work begins.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective removals. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Pre demolition Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 - Administrative Requirements. Review methods and procedures related to selective removals including, but not limited to, the following:
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective removals schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

1.9 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective removals area. Conduct selective removals so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
   2. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

B. Owner assumes no responsibility for condition of areas to be selectively demolished.

C. Hazardous Materials: Hazardous materials are present in building to be selectively demolished. A report (See Appendix included in the project manual) on the presence of hazardous materials is on file for review and use. Examine report 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.

D. Storage or sale of removed items or materials on-site will not be permitted.
   1. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective removals operations.
      a. Maintain fire-protection facilities in service during selective removals operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective removals, by methods and with materials so as not to void existing warranties.

1. Existing roofing is under warranty. Remove material by sub contractors authorized and approved by manufacture.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
   1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   2. Use materials whose installed performance equals or surpasses that of existing materials.
   3. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective removals required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or un planned collapse of any portion of structure or adjacent structures during selective removals operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective removals activities.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective removals operations.
   1. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
      a. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.
   2. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
      a. Arrange to shut off indicated utilities with utility companies.
      b. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective removals provide temporary utilities that bypass area of selective removals and that maintain continuity of service to other parts of building.
         a) Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
   3. Utility Requirements: Refer to Division 22, 23, and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective removals work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammable, or other dangerous materials before proceeding with selective removals operations.

B. Site Access and Temporary Controls: Conduct selective removals and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

D. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

E. Protect existing site improvements, appurtenances, and landscaping to remain.

F. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

G. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

H. Provide protection to ensure safe passage of people around selective removals area and to and from occupied portions of building.

I. Provide temporary weather protection, during interval between selective removals of existing construction on exterior surfaces and new construction, INCLUDING BUT NOT LIMITED TO REMOVAL OF EXISTING ROOFING, REMOVAL OF EXISTING FACE BRICK AND REMOVAL OF EXISTING MASONRY CAVITY WALLS, CONCRETE WALLS AND SIMILAR CONSTRUCTION, to prevent water leakage and damage to structure and interior areas.

J. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective removals operations.

K. Cover and protect furniture, furnishings, and equipment that have not been removed.

L. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

M. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Temporary Shoring: Provide and maintain [interior] [and] [exterior] shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
    a. Strengthen or add new supports when required during progress of selective removals.

N. The following procedures shall be followed when ceilings, partitions, roofing, face brick and masonry cavity walls are removed **and do not contain asbestos: (Asbestos and lead containing material shall be removed as per asbestos and lead abatement sections of the specifications).**

1. Work must be in compliance with OSHA Construction Standard (29 CFR 1926.62)..
2. **The GC Construction Contractor Contract #1 shall provide and pay all costs for:**
    a. Windows directly below, above and adjacent to the work area shall be closed.
    b. All existing casework, fixed furniture, books, computers and similar shall be provided one layer of six mil plastic.
    c. All air vents in the room shall be closed and/or shut off and sealed.
    d. Access to all rooms undergoing removals shall be restricted to prevent unauthorized entry.

e. All moveable objects will be moved from the room by the Owner. The General Construction Contractor Contract #1 shall cover floor with a drop cloth or similar protection approved by the Construction Manager.

f. All corridors used by all Contractors shall be protected and mopped and left clean daily.

g. Provide labor for daily cleanup on the interior and exterior of the building as required or directed by the Construction Manager. Refer to Section 01 5000 - Temporary Facilities and Controls for additional requirements Any visible debris shall be removed on a daily basis. Only wet cleaning methods and/or HEPA vacuuming shall be used to clean.

h. At completion of the work in each area the area shall be HEPA vacuumed and wet wiped.

3. Each Contractor shall disposed of all debris properly in accordance with Federal, State and Local Regulations. Refer to Section 01 5000 - Temporary Facilities and Controls for containers required.

3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

B. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Wet mop floors to eliminate tackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

D. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

E. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective removals operations. Return adjacent areas to condition existing before selective removals operations began.

3.5 SELECTIVE REMOVALS

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 removals systematically, from higher to lower level. Complete selective removals 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 fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective removals equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

10. Return elements of construction and surfaces that are to remain to condition existing before selective removals operations began.
11. Existing Facilities: Comply with Construction Manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective removals operations.
12. Removed and Salvaged Items: Comply with the following:
    a. Clean salvaged items.
    b. Store items in a secure area until delivery to Construction Manager.
    c. Transport items to Construction Manager's storage area on-site in area designated by Construction Manager.
    d. Protect items from damage during transport and storage.
13. Removed and Reinstalled Items: Comply with the following:
    a. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
        a) 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.
14. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective removals. When permitted by Construction Manager, items may be removed to a suitable, protected storage location during selective removals, cleaned, and reinstalled in their original locations after selective removals operations are complete.
15. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
16. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
17. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
18. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
19. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
20. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS Refer to Section 01 7310

3.7 SPECIAL REQUIREMENTS

A. All existing systems are required and shall remain operational during the performance of the work.

B. Notwithstanding anything contained in the Contract Documents to the contrary, the contractor(s) shall not be permitted to disrupt operation of any building system or any of the services without Owner's prior written consent, which shall not be unreasonably withheld. Any request to perform such work shall be in writing, received by Owner and Architect no less than 5 working days prior to the commencement of the request for disruption, and shall detail:
    1. The exact nature and duration of such interruption;
    2. The area of the Building affected, and;
    3. Any impact upon the Construction Schedule caused by such proposed temporary disruption. All Work shall be performed during the hours and on the days set forth in the Specifications.
    4. All required shutdowns shall be performed after hours or weekend.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.9 CLEANING

A. Sweep the building broom clean on completion of selective removals operation.

END OF SECTION

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WASTE MANAGEMENT REQUIREMENTS

A. Port Chester-Rye UFSD requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor(s) shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.
   5. Crushing of materials.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 7000 - Execution: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.4 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to Port Chester-Rye UFSD.
3. Landfill Disposal: Include the following information:
    a. Identification of material.
    b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Incinerator Disposal: Include the following information:
    a. Identification of material.
    b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.
    c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
    d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
5. Recycled and Salvaged Materials: Include the following information for each:
    a. Identification of material, including those retrieved by installer for use on other projects.
    b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
    c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
    d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
    e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

6. Material Reused on Project: Include the following information for each:
   a. Identification of material and how it was used in the project.
   b. Amount, in tons or cubic yards (cubic meters).
   c. Include weight tickets as evidence of quantity.
7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Port Chester-Rye UFSD, and Fuller and D'Angelo P.C..

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Pre-bid meeting.
   2. Pre-construction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SITE WASTE HANDLING AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Handling, transport and off-site disposal of solids including excess soils from the excavations, sediments, construction debris and liquids.

1.3 RELATED SECTIONS

A. Section 01 7330 - Selective Removals.

B. Section 01 7419 - Construction Waste Management and Disposal

C. Section 31 2316 - Excavation.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall obtain waste characterization profiles for off-site disposal of all waste materials and shall obtain any required permits.

B. The Contractor shall certify in writing that:

1. The facility(s) receiving each shipment of materials from the site(s) is licensed and approved by the appropriate state and federal agencies to accept the materials shipped.
2. The facility(s) will provide the treatment and/or disposal services indicated.
3. The facility(s) has sufficient capacity to and will accept the quantities of waste materials, debris and contaminated materials to be generated under this Contract within the period of performance of this Contract.

3.2 HANDLING AND DISPOSAL

A. Unless other arrangements have been made with the Construction Manager, all solid material must be promptly removed from the site at the end of each workday. The excess soils from the construction site that cannot utilized on the project fall into this category. During the excavation, if any material appears to be contaminated by the presence of discoloration and or odorous, shall be stored separately for other material for off-site disposal. All other excavated soils that appear to be clean shall be incorporated into the construction for backfill. when approved byConstruction Manager and Geo-Tech Engineer

B. Only at the discretion of Construction Manager and Geo-Tech Engineer may solid material be temporarily stored near an excavation area. All excavated material shall be secured in weatherproof containers, or secured on and covered by 6 mil polyethylene sheets with erosion control measures. At the end of each day's activities, the Contractor shall transfer soil either to a storage area located in an area as directed by the Construction Manager and Geo-Tech Engineer , or hauled off site. All material stored on site shall be protected from weather. No waste material shall be permitted to be held on-site for more than thirty (30) days.

C. Soil and construction debris must be transported by the Contractor to a licensed off-site disposal facility. All stored material must be protected from the weather. The Contractor shall collect waste classification samples, if required by the disposal facilities.

Any and all contaminated soils shall be transported by the Contractor to an off-site treatment/recycling facility. Such treatment may include thermal, asphalt batching or bioremediation processes. Certificates of destruction must be delivered to the Construction Manager and Geo-Tech Engineer immediately after treatment of the soils.

D. Prior to the transporter leaving the site, the Contractor shall prepare and provide the Construction Manager with copies of waste manifests for each shipment of wastes leaving the site(s).

E. Within three (3) days of return to the Contractor, the Contractor shall provide the Construction Manager and Geo-Tech Engineer with copies of completed waste manifests and certificates of destruction indicating that each waste shipment has been received at the waste disposal facility and properly treated.
   1. Should any waste manifest or certificates of destruction not be returned within two (2) weeks of shipment, the Contractor shall initiate follow-up and shall document its follow-up efforts in an appropriate report prepared under this paragraph which shall be furnished to the Construction Manager and Geo-Tech Engineer .

F. Marking, labeling, placarding, packaging and manifesting wastes shall be in accordance with all local, state and federal regulations prior to transport off-site.

G. The Contractor shall provide the empty and full weights of all transporters carrying solid materials from the site(s). A written scale receipt shall be provided to the Owner/Engineer within twenty-four (24) hours after a full transporter leaves the site.
   1. When a transporter carrying liquid leaves the site, the Contractor shall provide the number of gallons to the Construction Manager.

H. No waste or other materials shall remain on-site following site cleanup and Contract closeout. No waste material shall be stored on-site for more than thirty (30) days. Off-site storage of waste materials will not be paid for by the Architect and Construction Manager but shall be at the Contractor's expense.

I. The Contractor shall comply with all applicable regulatory requirements listed as well as other applicable federal, state or local laws, codes and ordinances that govern or regulate hazardous and/or non hazardous wastes.

3.3 WASTE MATERIAL TO BE HANDLED BY THE CONTRACTOR

A. Solid Material:
   1. Excess soils from excavations to be shipped to an off-site disposal facility;
   2. Excavated contaminated soil to be shipped to an off-site treatment facility;
   3. Removed and cleaned metal objects such as petroleum storage tank(s), piping and associated appurtenances to be shipped to a metal recycler;
   4. General excavation debris such as demolished concrete, asphalt, large rocks and boulders to be shipped to an off-site construction debris landfill.

B. Liquid Material:
   1. Wash-water generated from washing down heavy equipment, sampling equipment and decontamination activities to be transported to an off-site treatment facility;
   2. Petroleum product and sludges from tank(s) and pipeline cleaning operations to be transported to an approved off-site treatment/recycling facility;
   3. Petroleum contaminated groundwater from the tank(s) excavation to be treated on-site or transported to an approved off-site treatment facility;

C. Disposable Health and Safety Equipment:
   1. Material generated by, Contractor and its subcontractors to be shipped to a licensed off-site facility.

END OF SECTION

PROCEDURES AND SPECIAL CONDITIONS FOR SEPARATE PRIME CONTRACTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. The types of minimum requirements for procedures and performance or control work of a general nature, to be fulfilled collectively by prime contractors, and must be participated in by each prime contractor (where applicable) even though certain lets of work may be assigned to a specific prime contractor.

1.3 RELATED REQUIREMENTS.

A. Section 01 1000 Summary of Contracts: Use of premises.

B. Section 01 1010 - Milestone Schedule.

C. Section 01 5000 - Temporary Facilities and Controls.

D. Section 01 7000 - Execution.

E. Refer to reference drawing, "Site Safety Plan".

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each specified item.

D. Samples: Submit sample when requested.

E. Manufacturer's Installation Instructions: Provide installation requirements and rough-in dimensions.

F. Project Record Documents: Record actual locations of each item.

1.5 MISCELLANEOUS PROVISIONS:

A. Except as otherwise indicated comply with applicable requirements of Division-22, 23, and 26 sections for mechanical/Electrical provisions within units of general Divisions 2-14, 31, 32, and 33.

B. Service Connections: Refer to Divisions-22, 23, 26, 31, 32, and 33 sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilization of available services, as indicated. Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.

1.6 DISSIMILAR METAL

A. Wherever dissimilar metals would otherwise come in contact with each other, they must be isolated by use of an approved, permanent non-staining material. Where one of the metals is aluminum, a coat of zinc-chromate primer followed by a coat of alkali-resistant bituminous paint shall be applied.

1.7 MODIFICATION OF WORK

A. Where necessary, because of job or space conditions, the Contractor shall modify his work to suit these conditions, within accepted standards and limitations. No allowance will be made for this modification.

1. If work is executed without regard for other trades as cited above, the Construction Manager may direct its removal and modification. No allowance will be made for this work.

1.8 QUIET OPERATION

A. All work shall operate under all conditions of load without any sound or vibration which, in the opinion of the Architect or Construction Manager, is objectionable. In the case of moving machinery, sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own

room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Architect or Construction Manager shall be corrected in an approved manner by the Contractor at his expense. Provide vibration isolators on all moving machinery.

1. Refer to special sound control construction for band, coral and CAD rooms and Division 13 specifications.

1.9 ACCESSIBILITY, SIZE AND LOCATION OF EQUIPMENT AND WORK

A. Each Contractor shall investigate each space into and through which equipment must be moved. Equipment shall be shipped from manufacturer. in sections. of size suitable for moving through restricted spaces.

B. Each Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate thickness of partitions, and sizes of duct enclosures, for the proper installation of his work. They shall cooperate with the all other contractors whose work is in the same spaces and shall advise the Construction Contractor of their requirements. Such spaces and clearances shall, however, be kept to the minimum size required.

C. Each Contractor shall locate all equipment, which must be serviced, operated or maintained in fully accessible positions. Equipment shall include, but not be limited to: valves, traps, cleanouts, motors, controllers, switch-gear, drain point, etc. Minor deviations from drawings may be made to allow for better accessibility, but changes of magnitude or which involves extra cost shall not be made without approval.

1.10 ACCESS DOORS

A. Refer to Section 08 3100 - Access Doors and Panels

B. Each Contractor shall provide all access doors for all dampers, valves, cleanest, junction boxes, pull boxes or similar items located above finished ceilings or ceiling breaks or extensions, behind finished walls or below finished floors. The access doors shall be stainless steel or steel, hinged types as required for type of construction.

1. Where feasible locate all dampers, valves, cleanest, junction boxes, pull boxes or similar items above acoustical panel tile ceiling.
2. Group together concealed boxes, control valves, dampers and other mechanical and electrical equipment requiring access for operation, maintenance and repair, to reduce number of access doors required.
3. Group together concealed boxes, control valves, dampers and other mechanical and electrical equipment requiring access for operation, maintenance and repair, to reduce number of access doors required.
4. Where electric motors or heaters are installed above hung ceilings, provide disconnect switch in hung ceilings within reach from access doors, unless switch is located on wall immediately below.
   a. Disconnect switch shall be provided by the Contractor furnishing the equipment unless shown otherwise.
5. All access doors in Toilets, Janitor Closets, Science and Prep Rooms, Storage Rooms, and Kitchen and Food Related Areas and similar spaces shall be watertight and constructed completely of stainless steel type 302.

1.11 MACHINERY GUARDS

A. Moving parts of machinery exposed to contact by personnel shall be guarded by a barrier of a type a approved by the Architect.

1. Exposed moving parts such as belts and couplings shall have 3/4" No 16 gauge galvanized expanded metal mesh guards, with all edges rounded. Guards shall be 1-1/2" x 1-1/2" x 1/8" angle iron framed properly supported.
2. All machinery guards covering the ends of motor or equipment shafts shall have openings for the insertion of a tachometer.

1.12 DRIP PANS

A. The respective mechanical contractor shall provide 20 oz. copper all soldered reinforced pans with 2" high lips under all heating, domestic water piping, soil and waste piping which runs over electric switchboards, mounting boards, motors or electric motor starters. Each drip pan shall have a copper drain piped to discharge where shown on the drawings, of if not shown, to discharge to the nearest available open drain where directed by the Construction Manager. All piping shall be copper 1-1/2" minimum in diameter.

1.13 CONCEALMENT OF UNSIGHTLY INSTALLATIONS

A. Piping and conduit work is to be run concealed in all areas, in partitions, construction and pipe spaces. Obtain exact dimensions locations of partitions, use special care to see that no Joints, fittings, piping or conduit will be exposed except as shown or specified. In the event of any unsightly exposed piping or conduit work or unsightly partitions resulting, the responsible Contractor shall rebuild, and re-run lines at his own expense.

1.14 VERMIN CONTROL

A. All piping, ducts and the like passing through non rated walls, floors, slabs, ceilings and other solid construction, shall be sealed to prevent the passage of vermin.
   1. These seals shall be by means of Johns-Manville Uni-seal or Duxseal packed sleeves or other approved construction. Philip Carey Corp., and 3M Company, shall be considered equal.

B. All piping, ducts and the like passing through rated walls, floors, slabs, ceilings and other solid construction, shall be fire stopped in accordance with Section 07841 Through Penetration Firestop Systems.

1.15 CHEMICAL FUMES AND OTHER CONTAMINATES

A. Each Contractor shall be responsible for the control of chemical fumes, gases 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.

B. Each Contractor shall be responsible to 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.

1.16 PROTECTION OF WORK AND MATERIAL

A. Each Contractor shall be responsible for the protection of all his work and shall make good all damage which may occur to his work prior to the date of the final acceptance. Ends of piping and/or conduit shall be plugged during construction to prevent debris and water from entering therein.
   1. Mechanical and electrical equipment shall be delivered and stored at the site, properly packed and crated. Each piece of equipment shall remain packed and crated at location until final installation. uninstalled and installed equipment and materials shall be protected against damage by weather, water, paint, plaster, moisture, fumes, dust or physical damage.

1.17 DAMAGE TO OTHER WORK

A. Each Contractor shall be held responsible for and be required to make good at his own expense any and all damage done to the Owners property, adjoining property, and/or to any work or material in place in the premises, or included in his contract, which is caused by his work or workmen. The decision as to which contractor is responsible for specific damages shall be the responsibility of the Architect/Engineer.
   1. From the commencement to the completion of the Project, each Contractor shall keep the parts of the work and the buildings free from accumulation of water no matter what the source or cause of

1.18 SUPPORTS FROM OVERHEAD CONSTRUCTION

A. Where overhead equipment does not permit fastening of supports for equipment, furnish at no additional cost to the Owner, additional framing, supplementary steel, etc., as required, subject to approval by the

Construction Manager. Specific types of hangers and supports which are required in certain areas are to be installed as indicated on the drawings.

1.19 ESCUTCHEONS

A. Where exposed un-insulated mechanical piping or conduits pass through floors, ceilings or walls of finished rooms, apply, approved hinged escutcheon of sufficient outside diameter to cover the pipe sleeve.
   1. Where exposed insulated pipes pass through walls, floors, or ceilings of finished rooms, provide escutcheons fastened to the sleeves.
   2. Finish shall be stainless steel in toilets, janitor's closet and similar "wet areas". Submit samples.

1.20 PUMPING

A. The General Construction Contractor for contracts 1, 2, 3 and 4 shall provide, maintain and operate pumps of adequate capacity required to maintain excavations, pits, trenches and depressions within the Contract Limit Lines as well as the Buildings free of water accumulated at any time and as necessary to permit the proper installation of the work required under all contracts. Disposal of pumped water shall be done with due respect to the rights of adjoining buildings. All costs in connection with the removal of water as above provided for shall be borne by the Contractor.

1.21 FLASHINGS

A. Refer to Section 07 6200 - Sheet Metal Flashing and Trim.

B. Cap Flashing:
   1. All cap flashings for HVAC, Plumbing and Electrical work shall be provided by the respective HVAC, Plumbing and Electrical contractor, except where specifically indicated or specified to be provided by the General Construction Contractor Contract #1.

C. Base Flashing:
   1. All base flashings and pitch pockets for all contracts to be installed in new roofing system shall be provided by each contractor.
      a. All base flashing and pitch pockets for equipment installed on existing roof systems shall be furnished and installed by the Contractor installing work or equipment. Work shall be compatible to existing roofing system and performed by installers acceptable to the roofing manufacturer so as not to void any existing roofing warranties. Prior to starting work on existing roof systems notify Construction Manager and roofing manufacturer.
      b. All base flashing shall be a minimum 12" above roof membrane.

1.22 WATERPROOFING

A. Where any work pierced waterproofing, including waterproof concrete, the method of installation shall be approved by Architect or Owner's Representative before work is done. Each Contractor shall furnish all necessary sleeves, caulking and flashing required making openings absolutely watertight.

1.23 SALVAGEABLE MATERIALS:

A. The Owner will prepare a list of salvageable items it wishes to retain. All salvageable items shall be delivered by the Contractor to a storage area designated by the Construction Manager on site. All demolished equipment etc., except those items specifically requested by the Construction Manager shall become the Contractor's property and shall be removed from the premises.

1.24 CONSERVATION:

A. General: It is a requirement for each prime contractor's supervision and administration of the work, that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials.

1.25 MATERIALS AND WORKMANSHIP

A. All material, apparatus and accessories shall be new and of the best quality of their respective kind.

1. Work and materials shall conform to the latest applicable requirements of the New York State Building Code including Reference Standards or National Board of Fire Underwriters and Local Municipal codes, where applicable. Refer to Section 01 4100 - Regulatory Requirements.
2. All labor shall be performed in a first-class workmanlike manner, and adequate supervision must be provided to insure against neglect or faulty installations of any part of the systems during the progress of the work.
3. Any inferior material and/or workmanship shall be removed at once, when directed by the Architect or Construction Manager and replaced with material and workmanship in accordance with the true intent and meaning of the drawings and specifications, at no additional cost to the Owner.
4. If material or equipment is installed before it is approved, as to manufacture and shop drawings, the Contractor shall be liable for the removal and replacement at no extra charge, if in the opinion of the Architect or Construction Manager the material or equipment does not meet the intent of the drawings and specifications.
5. If after installation (with or without prior approval) operation of any equipment proves to be unsatisfactory by reasons of defects, workmanship, error or omissions, the Owner reserves the right to operate equipment until it can be removed from service for correction or replacement by the Contractor. The Contractor shall pay for the repair of all damage to work of other prime contractors caused by this defective equipment and its correction or replacement.
6. No advertising matter exclusive of nameplates containing required data shall appear on any equipment without the written consent of the Architect or Construction Manager. The equipment furnished under this specification shall be essentially the standard product of a manufacturer regularly engaged in the manufacture of such equipment. Where two or more units of the same class of equipment are required, the units shall be products of a single manufacturer; however, the component parts of the equipment need not be products of the same manufacturer.

1.26 SELECTIVE REMOVAL OF EXISTING PLUMBING, HEATING, ELECTRICAL AND RELATED WORK

A. Comply with Section 01 7330 Selective Removals or and Divisions 22, 23 and 26.

B. All selective removal work shall be in accordance with the time schedule as specified herein.
1. All mechanical and electrical removals shall be performed as required to complete the work as intended.
2. Electrical Contractor shall check with local utility company and implement in the work any further requirements from the utility company.
3. Remove all plumbing, heating and electrical apparatus, equipment, specialties, drains, controls, hangers, bases supports, piping, pneumatic tubing, conduit, panels, switches, wiring, plumbing accessories and electrical fixtures, etc., that are not incorporated in the new layout or required.
4. Where removal is indicated, or implied, or not incorporated in the new layout, the item itself is to be removed completely together with all connecting conduits, specialties, supports, controls, etc. Connecting conduits are to be removed back to the mains and panels where they are to be capped or disconnected. All abandoned open ends shall be sealed and capped or disconnected. This includes all heating, electric, water, gas, etc. Patching and finishing of all surfaces to match existing shall be performed by Contractor doing the removal.
5. Where existing conduit, etc., enter inaccessible trenches, tunnels, shafts, walls, and ceilings, inside of the existing building, they shall be cut back at least 2" into such inaccessible spaces and shall be suitably capped and sealed by the Contractor.
6. Each Contractor shall exercise all normal caution to prevent unnecessary cutting and damage to the existing building. Any excessive damage, as determined by the Construction Manager shall be repaired and paid for by the Contractor causing the damage.

1.27 ELIMINATION OF NOISE AND VIBRATION

A. All equipment and accessories shall operate without objectionable noise or vibration.

1. Should operation of any one or more of the systems produce noise or vibration which is, in the opinion of the Architect or Construction Manager objectionable, the Contractor shall, at his own expense, make changes in equipment and do all work necessary to eliminate the objectionable noise or vibration.
2. All work shall operate under all conditions of load without any sound or vibration which, in the opinion of the Architect or Construction Manager's, representative is objectionable. In the case of moving machinery, sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Architect or Construction Manager's representative shall be corrected in an approved manner by the Contractor at his expense.
    a. Provide vibration isolators on all moving machinery.
    b. Refer to special sound control construction for band, coral and CAD rooms and Division 13 specifications.

1.28 GENERAL LABELING

A. All mechanical and electrical equipment such as unit ventilators, heating and ventilating units, exhaust fans, etc., together with their component parts, control boards, electric panels, gauges, thermometers, switches, controls, valves, dampers shall have appropriate descriptive labels, identification tags and nameplates, furnished and installed under the respective control under which the corresponding item is provided, and shall be properly placed and permanently secured to (or adjacent to) the item being installed.
    1. Submit complete schedules, listings, and descriptive data, together with samples for checking and approval before purchasing.
    2. Refer to respective M/E specifications for additional requirements.

1.29 IDENTIFICATION OF PIPING

A. The respective Mechanical Contractor shall provide on all new exposed, insulated and uninsulated piping, semi-rigid, wrap-around plastic identification markers.
    1. Each marker background is to be appropriately color-coded with a clearly printed legend to identify the contents of the pipe conformance with the Scheme for the Identification of Piping Systems (ASA A13.1-1956). Direction of flow arrows is to be included on each marker.
    2. Exposed locations for the pipe markers to be as follows:
        a. Adjacent to each valve.
            a) At each branch and riser take-off.
            b) At each pipe passage through wall, floor and ceiling construction.
            c) On all horizontal pipe runs - marked every 15 feet.
            d) At each inlet and outlet of coils, pumps, etc.
    3. Refer to respective M/E specifications for additional requirements.

1.30 PAINTING

A. All apparatus, cabinets, etc., furnished under the Mechanical and Electrical Sections of the specifications, shall be provided with a priming coat, and enamel finish. All patched surfaces and surfaces where removals have occurred (by each Contractor) shall receive a prime coat and a finish coat to match adjacent surfaces acceptable to the Architect or Construction Manager unless noted otherwise.
    1. All finish painting of new insulated and uninsulated piping, new duct work, apparatus, and appurtenances, will be performed by each contractor, unless noted otherwise.
        a. Refer to Section 09 9123 - Interior Painting for additional information.
    2. All concealed supports and ironwork not otherwise protected against corrosion shall be given two (2) coats of bituminous base paint.

1.31 TEMPLATES:

A. Each contractor shall prepare templates showing all dimensions and shall furnish all anchor bolts and sleeves required for all equipment, boilers, transformers, tanks, etc., and submit to Contractor who requires this information.

1.32 EQUIPMENT BASES

A. Each contractor shall submit for approval of the Architect, detail drawings of all equipment foundations and shall furnish all templates for his foundation.

1. Unless otherwise indicated each Contractor will furnish and install all interior bases. It is the responsibility of each Contractor to place any templates and anchor bolts and to supervise the construction of the equipment bases regardless of who installs the bases.
    a. Concrete equipment bases for shall be minimum 3,000 psi test strength at 28 days and shall conform to the requirements of the Section 03300. Provide minimum 6/6 x 10/10 welded wire mesh.

1.33 MOTORS

A. Each contractor shall furnish and install the electric motors required for the motor-driven equipment supplied under his contract. The motors shall be of sufficient size for the duty to be performed, and shall not exceed their full rated load when the driven equipment is operating at required capacity under the most severe conditions likely to be encountered. The speed and horsepower for each motor are given in the schedule on the drawings, or are specified.

1. All motors shall be suitable for operating on alternating current, sixty (60) cycle frequency. Motors 1/2 horsepower and smaller shall be wound for single-phase, 60 cycle, 120 volt current. Motors exceeding 1/2 horsepower shall be designed for operation on three phase, 60 cycle, 208 Volt current.
2. Fractional horsepower motors shall be of the sealed prelubricated ball bearing type.
    a. All motors shall be approved by the Underwriters Laboratories, Inc., for the service and location intended.
    b. All motors shall be equipped with ball bearings unless specified otherwise in other sections of these specifications.
    c. Motors for single-phase operation shall be of the capacitor type.

1.34 WIRING

A. The wiring of prewired equipment or apparatus is specified under the corresponding sections of the Specifications. The Electrical volt systems design as indicated on the Electrical Drawings and Specifications.

B. The Electrical Contractor will perform all Power wiring; however, each Contractor shall furnish all magnetic starters and automatic controls, suitable for the equipment furnished by the Contractor. Motor starters shall be installed by the Electrical Contractor.

C. Each Contractor shall prepare wiring diagrams and submit same for approval. Submit 2 copies. Two (2) approved copies with any additional instructions are to be given to the Electrical Contractor.

1. All prewired and job wired control panels for motors shall be provided with approved high interrupting capacity circuit breakers.
2. All electrical wiring for equipment where exposed to the weather (factory or field installed) shall be installed in weathertight conduits and shall be U.L. approved.

1.35 CONTROL WIRING:

A. Control wiring is required wiring, conduit, relays, contractors, electro-mechanical, hydraulic activators and solid state regulating devices either low or line voltage, to the controlled device that is regulated by the controller and necessary for the operation, controlling, sequencing etc. of the equipment or system. Control wiring shall be furnished and installed by each contractor furnishing and installing such equipment or systems.

1. Power wiring to equipment, including wiring and installation of magnetic starters and disconnect switches, where required, shall be the responsibility of the Electrical Contractor, except where required by each contractor. The Electrical Contractor shall furnish and install all disconnect switches, and install all magnetic starters where required. All magnetic starters shall be furnished by each contractor furnishing the equipment or systems.
2. Each Contractor shall supervise the wiring of all equipment included under his Contract.

1.36 MOTOR STARTERS

A. Except where specified to be motor or pedestal mounted as part of a prewired control panel furnished with the equipment they serve, all magnetic starters shall be provided by each Contractor. Magnetic starters, with thermal and under voltage protection, suitable for the voltages indicated, shall have a heater in each phase and reset button on the cover.
   1. Motors 7-1/2 HP and larger shall have Allen Bradley, Emerson Phase Guard or approved substitute phase failure relays suitable for the voltages indicated, included in the starter enclosure. Refer to specific section of specifications for special starters.

B. Motors over 10 HP shall be provided with variable frequency drive. (VFD).

C. Where the installation of phase failure non-reversing relays are required, these shall, wherever possible, be wired and installed at the equipment manufacturer's factory panel mounted equipment in connection with refrigeration equipment and temperature controls. Starters shall beAllen Bradley, Square D or approved equal.

1.37 UNDERWRITERS' LABORATORIES CERTIFICATION

A. All mechanical and electrical equipment shall bear the UL label of approval where such inspection service is furnished for the particular type of equipment.

1.38 LOCATIONS AND MEASUREMENTS

A. The locations of fixtures, appliances, conduits, etc., are specified and shown on the plans as accurately as possible, but in all cases, they are to be adjusted to the surrounding conditions. Contractor must take all measurements at the building, and should the space allotted for any appliance be inadequate, it shall be the Contractor's responsibility to immediately notify in writing, and shall he fail to do so, he must bear the expense necessary to correct the conditions. All work shall be coordinated with the work of other trades.

1.39 GROUNDING

A. Standards set forth by the latest edition of the National Electric Code, relative to the grounding of system and equipment, shall be followed together with the rules and regulations of the Utility Company. All non-current carrying metal parts shall be solidly grounded. All motor frames that are not clamped to supply conduits shall be grounded by suitable wire and ground clamp.
   1. The identified neutral wire or white wire of the interior wiring system shall be permanently grounded to the water services. The grounded wire shall be connected to the supply side of the main service switch and mechanically connected to an approved ground clamp and securely bonded to the water service at the point of entry. The ground connection shall be made on the supply side of the first main control valve. The conductors shall be protected from mechanical injury by rigid steel conduit to which the conductors shall be securely bonded in each length of connection. Conduit system shall be securely grounded to the above described ground of wiring system.
   2. Ground connections to water mains shall be made to non-current carrying metal parts of distribution panels, instrument cases, and instrument transformer cases.

1.40 JURISDICTIONAL DISPUTES

A. Refer to Section 01 1000

1.41 FIRESTOPPING:

A. All openings thru walls, floors, shafts, etc. shall be fire stopped with approved material to maintain rating. See Section 07 8400 - Firestopping.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Substantial Completion.

B. Final Completion.

C. Project Record Documents.

D. Operation and Maintenance Data.

E. Warranties and bonds.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.4 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion:
   1. Prepare a list of items to be completed and corrected, the value of items on the list, and reasons why the Work is not complete.
   2. Advise Architect and Construction Manager of pending insurance changeover requirements.
   3. Obtain and submit releases permitting Architect and Construction Manager unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

B. Prior to issuance of the Certificate of Substantial Completion, submit, in writing, a request to the Architect and Construction Manager a request to perform site inspection for the purpose of preparing a "punch list".

C. On receipt of request the Architect and Construction Manager will prepare a punch list.

D. Certificate of Substantial Completion will be issued **after completion of all punch list items** or Architect and Construction Manager will notify Contractor of items, either punch list or additional items identified by Architect, **that must be completed or corrected before a certificate will be issued**. After completion of "punch list" items submit the following:
   1. Application for Payment showing 100 percent completion for portion of the Work claimed as substantially completed the following:
   2. Manufacturer's Warranties (guarantees).
   3. Contractor's Warrantee Two (2) and all extended warrantees
   4. Maintenance agreements, if any.
   5. Manifest for disposal of Hazardous material.
   6. Manifest for disposal of material.
   7. Test/adjust/balance records.
   8. Maintenance Manuals and Instructions Manuals
   9. Spare parts and Attic Stock.
   10. Start-up performance reports.
   11. Changeover information related to Owner's occupancy, use, and maintenance.
   12. Final cleaning.

13. Advice on shifting insurance coverage.
14. Final progress photographs.
15. List of incomplete Work, recognized as exceptions to Architect's "punch list".
16. Removal of temporary facilities and services.
17. Removal of surplus materials, rubbish and similar elements.
18. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
19. As Built Drawings.
20. Project Record Documents.

E. Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
   1. If necessary re-inspection will be repeated and the contractor shall pay for all additional inspections.
   2. Results of completed inspection will form the basis of requirements for Final Completion

1.5 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect and Construction Manager will not process a final Certificate for Payment until after the inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
      a. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

B. Following Final Inspection acceptance of work submit the following:
   1. Final Application for Payment according to Division 1 Section 01 2000 - Price and Payment Procedures.
   2. Architect's punch list certifying all punch list items have been completed with each item signed off by the Construction Manager and Contractor.
   3. Update final statement, accounting for final changes to the Contract Sum.
   4. Release of liens from contractor, subcontractors, suppliers and all entitles of the contractor.
   5. Consent of Surety to Final Payment, AIA Document G707
   6. Final Liquidated Damages settlement statement.
   7. Contractor's Affidavit of Release of Liens (AIA G706A).
   8. Contractors Affidavit of Payment of Debts and Claims (AIA G706)
   9. Contractor's Certification of Payment of Prevailing Wage Rates.
   10. Contractor's Certification of Compliance that products comply with VOC requirements stated in Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
   11. Contractor's Certified Statement that no asbestos containing material was incorporated into the project.
   12. Asbestos manifest.
   13. Underwriters Certificate or equivalent.

1.6 SUBMITTALS

A. Contractor shall submit all documentation identified in this section within thirty (30) working days from the time the Contractor submits the list of items to be corrected, in addition to other rights of the Owner set forth elsewhere in the Contract Documents, to include but not limited to withholding of final payment. If the documentation has not been submitted within Thirty (30) day period, the Owner will obtain such through whatever means necessary. The Contractor shall solely be responsible for all expenses incurred by

the Owner, provided the Owner has advised the Contractor of this action seven 7 days prior to the culmination date by written notice.

B. Project Record Documents: Submit documents to Architect and Construction Manager with claim for final Application for Payment.

C. Operation and Maintenance Data:
   1. Refer to individual sections for other requirements.
   2. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect and Construction Manager will review draft and return one copy with comments.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

D. Warranties:

E. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Port Chester-Rye UFSD.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

3.2 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and approved Shop Drawings at the project site.

B. Each Prime Contractor is responsible for marking up Sections that contain its own Work and for submitting the complete set of record Specifications as specified.

C. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
   1. Accurately record information in an understandable drawing technique.

D. Content: Types of items requiring marking include, but are not limited to, the following:
   1. Revisions to details shown on Drawings.
   2. Locations and depths of underground utilities.
   3. Revisions to routing of piping and conduits.
   4. Locations of concealed internal utilities.

5. Changes made by Change Order or Construction Change Directive.
6. Changes made following Architect's written orders.
7. Details not on the original Contract Drawings.

E. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

F. Mark important additional information that was either shown schematically or omitted from original Drawings.

G. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

H. **Provide final record drawings on CD or USB in PDF Format.**

3.3 FORMAT

A. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Contractor shall certify and sign.

B. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Identify Record Drawing as follows:
1. Project name.
   a. Date.
   b. Designation "PROJECT RECORD DRAWINGS."
   c. Name of Architect and Owner's Representative.
   d. Name of Contractor.
   e. Contractor shall certify and sign each drawing

3.4 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.5 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.6 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.7 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Port Chester-Rye UFSD's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

1. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
2. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Owner, Architect., Construction Manager, Consultants, Contractor, and Subcontractors , with names of responsible parties.
3. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
4. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
5. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
6. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

D. Arrangement of Contents: Organize each volume in parts as follows:

1. Project Directory.
2. Table of Contents, of all volumes, and of this volume.
3. Operation and Maintenance Data: Arranged by system, then by product category.

a. Source data.
b. Operation and maintenance data.
c. Field quality control data.
d. Photocopies of warranties and bonds.

E. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
1. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

F. **In addition to binders all documents shall be provide in PDF format on CD or USB.**

3.8 WARRANTIES

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Port Chester-Rye UFSD's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

CHECKLIST FOR PROJECT CLOSEOUT

AND PROCESSING OF FINAL PAYMENT

JOB TITLE: - Port Chester-Rye UFSD Additions, Alterations And Related Work Port Chester High School

BOARD OF EDUCATION BID NUMBER;

CLOSE-OUT SUBMITTALS: (As Applicable)

[ ] PREVAILING WAGE CERTIFICATION.

[ ] UL CERTIFICATION

THREE (3) RING BINDER BROCHURES OF OPERATION AND MAINTENANCE MANUALS FOR ALL EQUIPMENT INSTALLED ON THE PROJECT INCLUDING THE FOLLOWING:

[ ] TYPED OR PRINTED INSTRUCTIONS COVERING THE CARE AND OPERATIONS OF EQUIPMENT AND SYSTEMS FURNISHED AND INSTALLED.

[ ] MANUFACTURERS INSTRUCTION BOOKS, DIAGRAMS, SPARE PARTS LISTS COVERING ALL EQUIPMENT.

[ ] INSTRUCTION OF OWNER'S REPRESENTATIVE IN CARE AND MAINTENANCE OF NEW EQUIPMENT.

[ ] ALL APPROVED SHOP DRAWINGS.

[ ] CERTIFICATES OF COMPLIANCE AND INSPECTION. (WHERE APPLICABLE ELECTRIC, ELEVATOR, ETC.)

[ ] SPARE PARTS AND MAINTENANCE MATERIALS. (RECEIPT SIGNED BY FIELD SUPERINTENDENT)

[ ] EVIDENCE OF COMPLIANCE WITH REQUIREMENTS OF GOVERNING AUTHORITIES (CERTIFICATES OF INSPECTION ELECTRICAL).

[ ] CERTIFICATES OF INSURANCE FOR PRODUCTS AND COMPLETED OPERATIONS.

[ ] NOTARIZED STATEMENT THAT ONLY NON-ASBESTOS MATERIALS WERE INSTALLED ON THIS PROJECT.

[ ] FULLY EXECUTED CERTIFICATE OF SUBSTANTIAL COMPLETION: AIA G704.

[ ] CONTRACTOR'S WRITTEN TWO-YEAR WARRANTY AND EXTENDED WARRANTIES (IF ANY REQUIRED).

[ ] PROJECT RECORD DOCUMENTS: SECTION 7800**.**

[ ] AS-BUILT DRAWINGS.

EVIDENCE OF PAYMENT AND RELEASE OF LIEN

[ ] CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS: AIA G706.

[ ] CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS - AIA G706A PRIME CONTRACTORS AND SUBCONTRACTORS.

[ ] CONSENT OF SURETY TO FINAL PAYMENT AIA G707.

REFER TO SECTION 01 7800 PAR 1.4 AND 1.5 FOR ADDITIONAL REQUIREMENTS. FINAL PAYMENT WILL NOT BE PROCESSED UNTIL ALL ITEMS INDICATED ARE RECEIVED IN ACCORDANCE WITH SECTION 01 7800 - CLOSEOUT SUBMITTALS.

END OF SECTION

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of Port Chester-Rye UFSD personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Conveying systems.
   6. Items specified in individual product Sections.

C. Training of Port Chester-Rye UFSD personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.
   4. Items specified in individual product Sections.

1.3 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.

B. Training Plan: Port Chester-Rye UFSD will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Construction Manager for transmittal to Port Chester-Rye UFSD.
   2. Submit to Commissioning Authority for review and inclusion in overall training plan.
   3. Submit not less than four weeks prior to start of training.
   4. Revise and resubmit until acceptable.
   5. Provide an overall schedule showing all training sessions.
   6. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.

2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
1. Identification of each training session, date, time, and duration.
2. Sign-in sheet showing names and job titles of attendees.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Port Chester-Rye UFSD's subsequent use.
1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.5 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Construction Manager.

B. Demonstration may be combined with Port Chester-Rye UFSD personnel training if applicable.

C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.2 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Construction Manager will provide classroom and seating at no cost to Contractor.

C. Provide training in minimum two hour segments.

D. Training schedule will be subject to availability of Port Chester-Rye UFSD's personnel to be trained; re-schedule training sessions as required by Port Chester-Rye UFSD; once schedule has been approved by Port Chester-Rye UFSD failure to conduct sessions according to schedule will be cause for Port Chester-Rye UFSD to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
1. The location of the O&M manuals and procedures for use and preservation; backup copies.
2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.

3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 01 9100 – COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. OPR and BOD documentation are included by reference for information only.

1.2 SUMMARY

A. Commissioning (Cx) is a systematic process of ensuring that all building systems perform interactively according to the owner's project requirements (OPR) and operational needs. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
   1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
   2. Verify and document proper performance of equipment and systems.

C. The commissioning process does not take away from or reduce the responsibility of the installing contractors to provide a finished and fully functioning product.

D. Related Sections:
   1. Sections 23 0800 and 26 0800 for additional mechanical and electrical commissioning requirements.

1.3 REFERENCES, RESOURCES

A. ASHRAE Guideline 0-2013: The Commissioning Process, ASHRAE, 2013

B. ASHRAE Guideline 1.1-2007: HVAC&R Technical Requirements for the Commissioning Process, ASHRAE, 2007

C. ASHRAE Guideline 1.4-2014: Procedures for Preparing Facility Systems Manuals, ASHRAE, 2014

D. ASHRAE Guideline 4-2008: Preparation of Operations & Maintenance Documentation for Building Systems, ASHRAE, 2008

E. ASHRAE Standard 202-2018: Commissioning Process for Buildings and Systems, ASHRAE, 2018

1.4 DEFINITIONS

A. Use of terms and abbreviations referring to the Building Automation System and Automatic Temperature Controls (BAS/ATC) Contractor and the Testing and Balancing (TAB) Contractor shall be understood to mean the Subcontractors to the HVAC Contractor for these specific portions of the Work

B. BOD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

C. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

D. CxA: Commissioning Authority.

E. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

F. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components

1.5 COORDINATION

A. Commissioning Team. The members of the commissioning team consist of the Commissioning authority (CxA), the Owner’s Project Manager (PM), the designated representative of the owner’s Construction Manager (CM), the General Contractor (GC or Contractor), the architect and design engineers (particularly the mechanical engineer) (A/E), the Mechanical or HVAC Contractor (MC), the Plumbing Contractor (PC), the Fire Protection Contractor (FPC), the Electrical Contractor (EC), the Test and Balance Contractor (TAB) representative, the Controls Contractor (CC), any other installing subcontractors or suppliers of equipment. The Owner’s facilities staff is also a member of the commissioning team.

B. Design Intent. The OPR and BOD shall be provided by the A/E project team to the CxA at the inception of the project, in fulfilment of the program documentation phase. These documents are required in developing the commissioning plan, systems manual, and operation and maintenance training plan.

C. Management. The CxA for this Project has been hired by the Owner. The CxA directs and coordinates the commissioning activities and reports to the Owner and the A/E.

D. Scheduling. The CxA will provide the initial schedule of primary commissioning events using the information gathered from the commissioning scoping meeting. The Commissioning Plan provides a format for this schedule. The timeline is fine-tuned as construction progresses. In particular, thirty (30) days prior to startup of the primary HVAC equipment, the CxA meets with the PM and Contractors and develops a detailed commissioning schedule based on completion of controls integration and testing and balancing. The CxA will approve the commissioning schedule.
1. The Construction Manager shall coordinate the requirements of Construction Scheduling with

this work.

1.6 COMMISSIONING PROCESS

A. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning during construction begins with an initial commissioning meeting conducted by the CxA, during which the commissioning process is reviewed with the commissioning team members.
2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending to plan, scope, coordinate, and schedule future activities, as well as resolve problems.
3. Equipment documentation, including detailed start-up procedures, is submitted to the CxA during normal submittals.
4. The Contractors develop the full start-up plan by combining the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally-used field checkout sheets.
5. The Contractors submit all completed startup plan documentation to the CxA for review and approval.
6. The CxA develops, executes, and documents functional performance test procedures in conjunction with the required support and coordination of the responsible contractor.
7. Items of non-compliance are resolved at commissioning meetings. Items that cannot be resolved with direct interaction at the meetings shall be forwarded to the designer of record for review, or coordinated with the manufacturer's representative for resolution.
8. Items of non-compliance in material, installation or setup are corrected at the Contractor's expense and the system retested.
9. Contractor / manufacturer equipment start-ups, ATC installation and head-end programming, and the preliminary TAB report are completed four (4) weeks prior to Substantial Completion. This includes submission of all associated documentation to the CxA, which is required to allow sufficient time for the CxA's Functional Testing to be performed. Contingent on these items and weather conditions, functional testing may be completed prior to occupancy.
10. Deferred testing is conducted as specified or required.

1.7 RESPONSIBILITIES

A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the Mechanical (or HVAC), TAB, and Controls Contractors are in Section 23 0800. The responsibilities of the Electrical Contractors are in Section 26 0800. It is noted that the services for the Project Manager, Construction Advisor, Architect, mechanical and electrical designers/engineers, and Commissioning Authority are not provided for in this contract. That is, the Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify the commissioning process.

B. All Parties

1. Attend the initial commissioning meeting conducted at the start of construction, the commissioning meeting held thirty (30) days prior to startup of the primary equipment, and additional meetings, as necessary.

C. Architect (of the A/E)

Construction and Acceptance Phase

1. Perform normal submittal reviews, construction observation, record drawing preparation, and O&M manual approval in accordance with Division 1, etc., as contracted.
2. Provide any design narrative documentation requested by the CxA.
3. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
4. Prepare and submit final record basis of design documentation for inclusion in the O&M manuals.

Warranty Period

5. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.

D. Mechanical and Electrical Designers/Engineers (of the A/E)

Construction and Acceptance Phase

1. Perform normal submittal review, construction observation, record drawing preparation, and O&M manual approval in accordance with Division 1, etc., as contracted.
2. Provide any design narrative and sequences documentation requested by the CxA.
3. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
4. Prepare and submit the final record basis of design and operating parameters documentation for inclusion in the O&M manuals.
5. Provide a presentation at the training session(s) for the Owner's personnel. The designers/engineers will provide an overview of the major systems and equipment in the facility, including for each system: the basis of design, why the system was chosen, an overview of its operation, and interactions with other systems, any special areas of which to be aware, etc.

Warranty Period

6. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.

E. Commissioning Authority (CxA)

The CxA is not responsible for design concept, design criteria, compliance with codes, design, general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving, non-conformance issues, or deficiencies; but ultimately that responsibility resides with the General Contractor and the A/E. The primary role of the CxA is to ensure that the Owner's project requirements are achieved through the construction and operation of the facility.

Construction and Acceptance Phase

1. Installation Observation: the CxA shall observe installation of each type of commissioned feature and system to ensure that they are properly installed according to the contract documents and manufacturers' instructions, and that other building systems or components do not compromise the performance of the feature.
2. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

3. Coordinate the commissioning work with the CM, ensure that commissioning activities are being scheduled into the master schedule.
4. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
5. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
6. Approve systems startup by reviewing start-up reports and by selected site observation.
7. Oversee sufficient construction and startup (construction checklist) of the control system and review the final point-to-point checkout completed by the Controls Contractor.
8. Develop, execute, and document functional performance test procedures.
9. Maintain a corrective action list (Issues Log) and a separate testing record. Provide to the Owner written progress reports and test results with recommended actions.
10. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.
11. Provide a final commissioning report. The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope, and a general description of testing and verification methods. For each piece of commissioned equipment, the report shall contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:
    a. Equipment meeting the Owner's project requirements
    b. Equipment meeting the equipment specifications
    c. Equipment ensuring proper installation
    d. Functional performance and efficiency
    e. Equipment documentation
    f. All outstanding non-compliance items shall be specifically listed.
    g. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall refer to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

Warranty Period

12. Coordinate and supervise required seasonal or deferred testing and deficiency corrections and provide the final testing documentation for the commissioning record and O&M manuals.

F. Owner's Project Manager (PM)

Construction and Acceptance Phase

1. The Owner manages the CxA contract.
2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan—Construction Phase.
3. Provide final approval for the completion of the commissioning work.

Warranty Period

4. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.

1.8 SYSTEMS TO BE COMMISSIONED

A. The systems that shall be commissioned in this project, including but not limited to the following:
   1. HW Pumps
   2. Air Handling Units
   3. Energy Recovery Units
   4. VRF Air Conditioners
   5. Motor controllers and VFDs
   6. Domestic hot water
   7. Lighting and lighting controls
   8. Uninterruptable power supply systems (UPS)
   9. Emergency generator and automatic transfer equipment

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MEETINGS

A. Initial Commissioning Meeting. Within ninety (90) days of commencement of construction, the CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties, as necessary, by the CxA. Information gathered from this meeting will allow the CxA to prepare the Commissioning Plan, which will also be distributed to all parties.

B. Equipment Startup Coordination Meeting. Thirty (30) days prior to startup of the primary HVAC equipment, the CxA meets with the PM, CM and Contractors and develops a detailed commissioning schedule. Prior to this meeting, the Contractors shall submit to the CxA the full start-up plan.

C. Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors.

3.2 REPORTING

A. The CxA will provide regular reports to the CM or PM, with increasing frequency as construction and commissioning progresses. Standard forms are provided and referenced in the Commissioning Plan.

B. The CxA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through progress reports.

C. Testing or review approvals, and non-conformance or deficiency reports are made regularly with the review and testing as described in later sections.

3.3 SUBMITTALS

A. Provide one copy of approved shop drawings and startup reports for all commissioned equipment to the CxA. Supplement the shop drawing data with the manufacturer's installation and start-up procedures as well as unit-specific performance data (fan/pump curves) and any factory test reports. Also include warranty information, including details of the Owner's responsibilities in regard to keeping warranties in force. This material should be identical to the literature which will be included in the Operation and Maintenance Manuals.

B. The CxA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the basis of design documentation and sequences provided with the Specifications.

C. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the A/E will approve them.

3.4 START-UP AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned.

B. General. Contractor start-up is important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full Contractor start-up. The start-up for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

C. Start-up and Initial Checkout Plan. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed.
   1. The Contractors develop the full start-up plan by combining the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally-used field checkout sheets. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
   2. The Contractors submit all completed startup plan documentation to the CxA for review and approval.
   3. For systems that may not have adequate manufacturer startup and checkout procedures, particularly for components being integrated with other equipment, the contractor should provide the added necessary detail and documenting format to the CxA for approval, prior to execution.
   4. The full start-up plan shall consist of:
      a. The manufacturer's standard written start-up procedures, copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
      b. The manufacturer's normally-used field checkout sheets.

D. Execution of Startup and Checkout Procedures.
   1. Thirty (30) days prior to startup, the contractors and vendors schedule startup and initial checkout with the A/E and CxA. A commissioning meeting will be held at this time for all parties.
   2. The Contractors and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed start-up and checkout procedures.

3. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for supervisors to fill out these forms.

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup.
1. The Contractors shall clearly list any outstanding items of the initial start-up and checkout procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two (2) days of test completion.
2. The CxA will review the report and submits either a non-compliance report or an approval form to the PM. The installing Contractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA will recommend approval of the start-up plan to the PM.

3.5 FUNCTIONAL PERFORMANCE TESTING

A. The CxA shall execute all functional performance testing.

B. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the documented Owner's Project Requirements (OPR), Basis of Design (BOD) and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full- load, etc.) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, high/low pressure, no flow, equipment failure, etc. shall also be tested.

C. Coordination and Scheduling. The Contractors shall provide sufficient notice to the CxA regarding their completion schedule for the startup of all equipment and systems. The CxA shall provide written notice of testing dates. In general, functional testing is conducted after startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CxA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air- related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

D. Problem Solving. The CxA will recommend solutions to problems found, however the burden of responsibility to solve and correct problems is with the Contractors and A/E.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation. The CxA will document the results of all functional performance tests using the specific procedural forms developed for that purpose. The CxA will include the completed forms in the Commissioning Report.

B. Non-Conformance.

1. If the Contractor is available, corrections of minor deficiencies identified may be made during tests, at the discretion of the CxA. In such cases the deficiency and resolution shall be documented on the procedure form.
2. Every effort shall be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless at the express, written request of the PM.
3. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
4. When there is no dispute on the deficiency, the Contractor accepts responsibility to document and complete the corrective action.
5. If there is a dispute about a deficiency, such as whether or not it is a deficiency, or who is responsible, the deficiency shall be documented and submitted to the A/E and CM for further review. Final interpretive authority is with the A/E. Final acceptance authority is with the PM.
6. Retesting: The CxA will direct the retesting of the equipment once at no charge to the Owner for their time. The CxA's time and expense incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction checkout by the installing contractors and spot-checked by the CxA during functional testing.

3.7 WARRANTY PERIOD TESTING

A. During the warranty period, the CxA shall complete seasonal testing (tests delayed until weather conditions are appropriate for one or more components to operate as designed) as required. The A/E shall coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning. Any final adjustments to the O&M manuals and record drawings due to the testing shall be made.

END OF SECTION 019100

SECTION 02080
ASBESTOS REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.01 Work Included

A. The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to perform the Work of this Contract. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, any other applicable federal, state, and local regulations and in accordance with these specifications. In the event there is a conflicting point between these provisions, the most stringent one shall apply.

B. The work will involve the removal of all Asbestos Containing Materials and all Asbestos Waste from within the Work Zones in accordance with all applicable rules and regulations and this specification. Location of asbestos indicated on the Drawings is provided for guidance only. The Contractor shall be responsible for establishing exact quantities and locations for abatement. The project will take place at Port Chester High School, located in Port Chester, New York.

Port Chester High School – VAT, leveling compound and Mastic
Removal and disposal of asbestos containing floor tile, leveling compound and mastic, window caulking and window glazing which may be impacted by the upcoming renovation program at Port Chester High School.

Floor Tile (12"x12") and the associated bonding mastic - Basement Coaches' Office - 300SF
Green Floor Tiles (2nd layer) and Black Mastic under Green Floor Tiles in room 251 – 376 SF
Brown Floor Tiles under the Carpet and Leveling Compound Mastic in Room 249 – 580 SF
Grey/Brown Window Caulking in a Basement and 1st Floor (old Boys Locker Room, Storage Room, Weight Lifting Room and Bathroom, Girls Coach Office and Bathroom) - 360LF
Grey/Brown Window Glazing - Basement and 1st Floor (old Boys Locker Room, Storage Room, Weight Lifting Room and Bathroom, Girls Coach Office and Bathroom) - 720LF

Removal shall be performed in accordance with New York State Industrial Code Rule 56, modified containment procedures and the Contract Documents.

The project shall be conducted as follows:

Port Chester High School
Removal and disposal of approximately 1256 square feet of asbestos containing floor tile, leveling compound and mastic, 360 LF of window caulking and 720 LF of window glazing to facilitate the proposed renovation work. Asbestos removal of all Asbestos containing materials shall be conducted using proper procedures as outlined in New York State Industrial Code Rule 56 and the contract documents. All contaminated debris shall be disposed of as asbestos containing material in accordance with all applicable rules and regulations. If a site-specific variance is required the contractor shall obtain one and all cost shall be borne by the contractor.

NOTE:

1) The abatement areas shown on the drawings are provided for guidance only and no claims are made as to their accuracy. **The Contractor is alone responsible for determining the actual abatement quantities. If quantities differ the Contractor is responsible for bringing the discrepancy to the Construction Manager/Engineer's attention before any removal work proceeds. Once the project is started the Contractor shall be responsible for the removal of all asbestos containing materials at the contractors cost regardless of differences in the stated quantities provided in this specification.**

2) **In the event that clearance samples do not pass, the Asbestos Abatement Contractor will be responsible for all costs associated with resampling.**

3) Removal of the asbestos containing materials from this building will be conducted in accordance with NYS Industrial Code Rule 56, applicable variances, a site specific variance (if required) and the contract documents.

4) During the project other trades will be working in the building, the Asbestos Contractor shall coordinate all of his work with the other trades as required.

5) The Contractor is responsible for using " standard of care " when applying or removing tape, spray adhesive or any other type of bonding material from the walls, floors or ceilings. If damage is sustained to an area during the work procedure directly related to the negligence of the contractor then that Contractor is responsible for returning the area back to its original condition unless otherwise noted.

6) Critical barriers and the doorways shown on the drawing shall be covered with three layers of at least six-mil polyethylene sheeting sealed with tape.

7) The Contractor shall be responsible for all utility cable protection within the Work Zone Limits.

8) The Contractor is required to abide by the most current Prevailing Wage Rates at the time of the abatement project.

9) The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to carry out the removal operation. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, and any other applicable federal, state, and local regulations and in accordance with these specifications. In the event there is a conflicting point between these provisions, the most stringent one shall apply.

1.02 Definitions

A. ABATEMENT: Procedures to control fiber release from Asbestos-Containing Materials. This includes encapsulation, enclosure, and removal.

B. AIRLOCK: A system for permitting egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two Curtained Doorways at least 3 feet apart.

C. AIR MONITORING: The process of measuring the fiber content of a specific volume of air in a stated period of time.

D. AREA MONITORING: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area, which is representative of the airborne concentrations of asbestos fibers in the breathing zone.

E. AMENDED WATER: Water containing a wetting agent or surfactant.

F. ASBESTOS: Any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumington-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, and actinolite.

G. ASBESTOS CONTAINING MATERIAL (ACM): Any Asbestos or any material containing more than one percent of Asbestos by weight or volume.

H. ASBESTOS CONTAMINATED OBJECTS: Any object which has been contaminated by Asbestos or Asbestos Containing Material. This shall include all unprotected porous materials in an Asbestos Work Area.

I. ASBESTOS CONTROL AREA: An area where Asbestos Abatement operations are performed, which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.

J. ASBESTOS WASTE: Any Asbestos Containing Material or Asbestos Contaminated Objects requiring disposal.

K. AUTHORIZED VISITOR: The Owner, the Engineer, or a representative of any regulatory or other agency having jurisdiction over the project.

L. CLEAN ROOM: An uncontaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for storage of workers' street clothes and protective equipment.

M. COMPETENT PERSON: One who is capable of identifying existing asbestos hazards in the Work place and who has the authority to take prompt corrective measures to eliminate them as specified in 29 CFR 1926.32(f); Reference 29 CFR 1926.58(b) for duties and responsibilities.

N. CRITICAL BARRIER: Any windows, HVAC diffusers (exhaust or return), pipe sleeves, penetrations, doorways or any other openings leading to an occupied area of the building or to the outside.

O. CURTAINED DOORWAY: A device to allow egress from one room to another while permitting minimal air movement between the rooms, typically constructed of three overlapping sheets of plastic over an existing or temporary door frame. Attach a weight to each sheet and seal at alternating edges so as to produce a zig-zag pattern of entrance or exit.

P. ENCAPSULANT: A liquid material which can be applied to Asbestos-Containing Material and which controls the possible release of Asbestos fibers from the Asbestos Containing Material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). This may also be used to seal surfaces from which asbestos containing materials have been removed.

Q. ENCAPSULATION: All herein specified procedures necessary to coat materials with an encapsulant to control the possible release of Asbestos fibers into the ambient air.

R. ENCLOSURE: All herein specified procedures necessary to complete enclosure of Asbestos Containing Materials behind an airtight and impermeable barrier.

S. EQUIPMENT ROOM: A contaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for the storage of contaminated clothing and equipment.

T. FIXED OBJECT: A unit of equipment or furniture in the Work Zone which cannot be removed from the Work Zone.

U. FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material that can be crumbled, pulverized, or reduced to powder when dry, by hand pressure or will crumble, be pulverized or produce powder when subjected to specific mechanical operation.

V. HEPA FILTER: A high efficiency particulate air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 micrometers in diameter.

W. HEPA VACUUM EQUIPMENT: High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97% efficiency for retaining fibers of 0.3 micrometers or larger.

X. HOLDING AREA: A chamber between the Washroom and an uncontaminated area in the Waste Decontamination Enclosure System. The Holding Area comprises an airlock.

Y. MOVABLE OBJECT: A unit of equipment or furniture in the Work Zone which can be removed from the Work Zone.

Z. NEGATIVE PRESSURE SYSTEM: A local exhaust system equipped with HEPA filtration that is capable of maintaining a minimum pressure differential of minus 0.05 inch of water column relative to adjacent unsealed areas.

AA. NON-FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the Asbestos is well bound and that when dry cannot be crumbled, pulverized or reduced to powder by hand pressure and will not be subject to mechanical operations.

BB. PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for Workers, typically consisting of an Airlock, an Equipment Room, a second Airlock, a Shower room, a third Airlock, and a Clean Room.

CC. PERSONAL MONITORING: Sampling of airborne asbestos fiber concentrations within the breathing zone of an employee.

DD. REMOVAL: All herein specified procedures necessary to strip all Asbestos Containing Materials from the designated areas.

EE. SHOWER ROOM: A room between the Clean Room and the Equipment Room in the Worker Decontamination Enclosure System, with hot and cold running water and suitably arranged for complete showering during decontamination. The Shower Room comprises an airlock between the Equipment Room and the Clean Room.

FF. SURFACTANT: A chemical wetting agent added to water to improve penetration of water into the Asbestos Containing Materials.

GG. TIME WEIGHTED AVERAGE (TWA): An 8-hour time weighted average of airborne fiber concentration per cubic centimeter of air. Three samples are required to establish the 8-hour time weighted average.

II. WASHROOM: A room between the Work Zone and the Holding Area in the Waste Decontamination Enclosure System. The Washroom comprises an airlock.

JJ. WASTE DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for materials and equipment, typically consisting of an Airlock, a Washroom, a second Airlock, and a Holding Room.

KK. WET CLEANING: The process of eliminating Asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as Asbestos Waste.

LL. WORK SITE: Premises where Asbestos Abatement is taking place. The Work Site includes, but is not limited to the Work Zone, the Personnel and Waste Decontamination Systems, the staging area, the disposal route and the loading dock.

MM. WORK ZONE: Any area indicated on the Drawings as Asbestos Abatement areas or as areas with Asbestos Containing Material.

1.03 Submittals

A. Submit the following items to the Engineer for review twenty (20) days prior to the commencement of Work associated with this section:

1. EPA Notification: The form required by the Environmental Protection Agency in accordance with the National Emission Standard for Asbestos, 40 CFR Part 61.

2. New York State Department of Labor Notification: The form required by the State of New York Asbestos Control Program in accordance with Article 30 of the New York State Labor Law.

3. Any proposed project specific variance to any of the applicable regulations.

Upon return of submittals from the Engineer with an action stamp indicating that the submissions have been reviewed and comply with the contract documents, file all notifications with the

appropriate agencies in accordance with all applicable regulations and these specifications. Pay the appropriate fees. All filing fees and associated costs shall be borne by the Contractor.

B. Submit the following items to the Engineer for review ten (10) days prior to the commencement of Work associated with this section. No Work shall begin until ALL submittals are returned with an action stamp indicating that the submission is in accordance with these specifications.

1. NOTIFICATIONS: Stamped received copies of the notifications (EPA only) and variances listed above in item A, as well as copies of the canceled checks used to pay all associated fees.

2. CONTRACTOR'S CERTIFICATION: Documentation confirming licensing by New York State Commission of Labor for asbestos Work in accordance with Industrial Code Rule 56.

3. WORKER DOCUMENTATION: Current copies of the AHERA certificates, New York State Department of Labor Asbestos Handling Certificates, Medical Exams and Respirator Fit Tests for all employees performing the Work of this Section.

4. EMPLOYEE RELEASE FORM: Prior to allowing an employee to perform any Work on the project, submit the properly executed Employee Release Form for each employee. A copy of this form is included herein.

5. CONTINGENCY PLANS: A copy of emergency, security, and contingency plans as follows:

   a. A plan to provide for emergency and fire evacuation of personnel from the Work Zone in an emergency. File a copy of this plan with the local fire and/or ambulance unit;

   b. A plan for maintaining the security of the Work Zone. The security plan shall provide a means of preventing accidental or unauthorized entry. Provide security to the decontamination facility and all points of potential access to the Work Zone 24 hours per day during abatement. Submit the form of security and safety log that will be maintained on the project;

   c. A contingency plan addressing emergencies, equipment failures, and barrier failure. Include the telephone numbers of at least three (3) responsible persons who shall be in the position to dispatch men and equipment to the project in the event of an emergency.

6. LANDFILL: Written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the New York State Department of Environmental Conservation (NYS Part 360 Permit) and by the US EPA. In the event the landfill is not located in New York State, approval from the agency having jurisdiction over the landfill must be received. Documentation that the proposed hauler and landfill have the proper permits and are willing to accept the asbestos waste.

   The hauler must have a Waste Transporter Permit pursuant to Article 27, Titles 3 and 15, of the Environmental Conservation Law from the New York State DEC, Division of Hazardous Substance Regulations (NYS Part 364 Permit).

7. MATERIAL SAFETY DATA SHEETS: For all products intended to be used on the project, a Materials Safety Data Sheet in accordance with the OSHA Hazard Communication Standard 29 CFR 1910.1200. Include a separate attachment indicating the specific worker protection equipment required for each material.

8. PRESSURE MONITORING DEVICES; Manufacturer's data on type of equipment to be used to provide a continuous record of pressure differentials. Provide a drawing showing locations and number of units to be used.

9. AIR FILTRATION DEVICES: Manufacturer's data on type of equipment to be used to remove airborne asbestos.

10. ROOM INSPECTION: Inspect all areas in which Work is to be performed. Inspection shall occur in the presence of representatives of the Owner and Engineer. Record any existing damage to components, such as walls, doors, windows, carpeting, fixtures, and equipment. Any damaged components found after completion of the Work will be repaired at the Contractor expense. Make arrangements for the inspection, notify the participants, record the findings, and issue minutes of the inspection to all participants.

11. SCHEDULES: A copy of construction, staffing, and equipment schedules:

    a. A construction schedule stating critical dates of the job including start and completion of mobilization, activation, deactivation, and demobilization of all Work activities (including mobilization, Work Zone preparation, asbestos abatement, inspection and clearance monitoring, each phase of refinishing, and final inspections). Update schedule with each partial payment request. Changes in schedule are subject to the Engineer's approval and require three (3) days prior notice.

    b. A schedule of staffing stating number of workers per shift, name and number of supervisor(s) per shift, hours per shift, shifts per day, and total days to be worked;

    c. A schedule of equipment to be used including numbers and types of all major equipment such as high efficiency particulate absolute (HEPA) air filtration units, HEPA vacuums, and airless sprayers.

12. INSURANCE POLICIES: The Environmental Contractor shall purchase and maintain during the life of this contract the insurances stipulated herein. This insurance must be purchased from a New York State licensed A.M. Best Rated "A" or "A+" carrier. The following list of Additionally Insured must be included under insurance policies held by the Contractor on this project with the exception of Workmen's Compensation and Employer's Liability Insurance, shall be named as additional insureds for the Commercial General Liability, Umbrella Liability, Hazardous Material Abatement General Liability and Business Automobile Policy:

    a. Port Chester-Rye Union Free School District and its employees
    b. Fuller & D'Angelo Architects and its employees
    c. Warren & Panzer Engineers and its employees

(1) *Workmen's Compensation and Employer's Liability Insurance:* Statutory Workmen's Compensation and Employer's Liability Insurance for all of his employees to be engaged shall require the Subcontractor similarly to provide Workmen's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work.

(2) *Commercial General Liability:*
Explosion, Collapse & Underground Coverage shall be provided.

Products & Complete Operations Aggregate shall be maintained for a period of two years after final acceptance of the Owner.

(3) *Automobile Insurance:* Comprehensive Automobile Liability Insurance on owned, hired, or non-owned vehicle in amounts not less than $1,000,000 Combined Single Limit each occurrence.

(4) *Conditions of Coverage:* Bodily Injury and Property Damage coverage under both Commercial General and Commercial Automobile Insurance shall include the "occurrence" basic wording, which means an event or continuous or repeated exposure to conditions, which results bodily injury, sickness or disease including death at any time resulting therefrom. Coverage shall include liability arising from water damage, and property in care, custody and control of Contractor and Subcontractor.

(5) *Hazardous Material Abatement General Liability Occurrence Insurance:* A policy without a sunset clause, in amounts not less than $1,000,000, each occurrence, naming the Owner as the Certificate Holder. Also, include insurance policies of any subcontractor, including the Sudden and Accidental Pollution Liability Insurance required of the Hauler.

(6) *Contractor's Contingent Liability:* The Contractor shall procure, and 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 Subcontractors under this Contract.

(7) *Contractor's and Employee's Equipment: 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 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.

a. Coverage, 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.

b. The form of the Certificate of Insurance shall be AIA Document G705, Certificate of Insurance. In addition to the Certificate of Insurance, the Contractor shall provide the Owner with copies of any endorsements subsequently issued amending coverage or limits.

13. AIR SUPPLY SYSTEM: Manufacturer's product information for each component used in the Type "C" supplied air respiratory system, including NIOSH and MSHA Certifications for each component in an assembly and/or the entire assembly. Provide a notarized certification that the system is capable of providing Grade "D" breathable air. Submit a copy of the manufacturer's operations manual for the air purification system and the carbon monoxide monitor.

Prepare a drawing showing the assembly of components into a complete supplied air respiratory system. Document the number and size of electric air pumps and/or air supply tanks to be kept at the site at all times to ascertain that sufficient air is being supplied to the maximum number of users. Prepare a diagram showing the location of the electric air pumps, the air supply tanks and the hose line connections. The use of gas compressors will not be allowed. Submit complete operating and maintenance instructions for all components and systems as a whole. Bind manual in a form suitable for field use.

C. Daily during the conduct of abatement activities, submit to the Engineer the following:

Printouts from pressure differential monitoring equipment marked with date and Work start/stop times for each day. Use printout paper that indicates elapsed time in intervals no greater than one hour. Indicate on each day recording times of starting and stopping abatement Work, type of Work in progress, breaks, and filter changes. Cut printout into segments by day and label with project name, Contractor's name and date;

D. Within thirty (30) days of removal from the premises, submit to the Owner the disposal certificate(s) from the landfill receiving the Asbestos Waste stating dates and quantities received.

E. Within seven (7) days of completion of all Work associated with this Section submit to the Owner, the following:

1. A bound copy of the job log book showing sign in and sign out of all persons entering the Work Zone, including name, date, time, and position or function and a general description of daily activity. Keep these records on file for the duration of employment plus 30 years;

2. A notarized statement attesting that all personnel performing any work under this Contract were compensated in accordance with the prevailing wage rates contained herein.

1.04 Special Reports

A. Except as otherwise indicated, submit special reports directly to the Owner and the Engineer within one (1) day of the occurrence requiring the special report, with copies to all others affected by the occurrence.

B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into Work Zone), prepare and

submit a special report listing date and time of event, chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

C. Report any accidents, at the site and anywhere else Work is in progress related to this project. Record and document data and actions. Comply with industry standards.

1.05 Quality Assurance

A. Where methods or procedures are specified, they shall constitute minimum measures and shall in no way relieve the Contractor of sole responsibility for the means, methods, techniques, sequences, or safety measures in connection with the Work.

B. Provide foremen who speak fluent English to supervise all abatement activities. Foremen shall be certified as handler supervisors in accordance with Section 902 of the New York State Labor Law Article 30, and have experience in this field and can furnish a record of satisfactory performance on at least three (3) projects for Work of comparable type.

C. Any proposed Subcontractor performing any Work under this Section "Asbestos Removal and Disposal" shall have similar qualifications. Submit qualifications with the BID for any proposed Subcontractor. Submit Subcontractor qualifications in the same form and quantity as required for the Contractor.

1.06 Applicable Standards and Regulations

A. Perform all Work in compliance with the most current version of all pertinent laws, rules, and regulations, existing at the time of Work, including, but not limited to:

1. Code of Federal Regulations

   a. Title 29 CFR Parts 1910.1001, 1910.1200, 1910.134 1926.58 and 1926.1101;
   [The Occupational Safety and Health (OSHA) Standards]

   b. Title 30 CFR Part 61, Subpart G;
   [The Transport and Disposal of Asbestos Waste]

   c. Title 40 CFR, Part 61, Subparts A and M;
   [The EPA National Emission Standard for Hazardous Air Pollutants, and the National Emission Standard for Asbestos]

   d. Title 40 CFR, Part 763,
   [Asbestos Containing Materials in Schools; Final Rule and Notice]

   e. Title 49 CFR Parts 106, 107, and 171-179.
   [The Transportation Safety Act of 1974 and the Hazardous Material Transportation Act]

   f. Public Law 101-637
   [ASHARA]

2. New York State Official Compilation of Codes, Rules and Regulations.

a. Title 12 Part 56

b. Title 10 Part 73

c. Title 6 Parts 360-364

d. Labor Law - Article 30 and Sections 900-912.

e. All applicable Additions, Addenda, Variances and Regulatory Interpretation Memoranda.

3. Applicable Standards

a. The American National Standard Institute (ANSI) Practices for Respiratory Protection ANSI Z88.2-1980.

b. The American National Standard Institute (ANSI) Fundamentals Governing the Design and Operation of Local Exhaust Systems.

c. UL 586 Test Performance of High Efficiency Particulate Air-Filter Units.

B. In the event there is a conflicting point between these provisions, the most stringent one shall apply.

1.07 Air Monitoring

A. Conduct personnel air monitoring in accordance with OSHA requirements. Collect a sufficient number of samples to determine the Time Weighted Average exposure of twenty percent (20%) of the work force.

B. The Owner will provide area air monitoring as follows:

Sample Type	Analysis Method
Pre-abatement	PCM
During abatement activities	PCM
Clearance air monitoring	PCM & TEM

The Contractor shall cooperate with the Owner's designated representatives with regard to air monitoring and project monitoring procedures. Ensure that employees and Subcontractors do the same.

C. If analysis of any of the air samples collected during abatement indicates that the airborne asbestos concentration outside the Work Zone is greater than or equal to 0.01 f/cc or the background level, whichever is greater:

1. Stop Work immediately;

2. Inspect the integrity of the barriers;

3. Wet clean and vacuum the location where elevated fiber counts were reported; and

4. Do not resume Work until such time when the airborne asbestos concentration outside the Work Zone is once again less than the above limit.

D. In order to pass PCM clearance testing, the analysis of each and every sample collected shall indicate that the airborne fiber concentration is less than 0.01 fibers per cubic centimeter or the background level whichever is greater.

E. In order to pass TEM clearance testing, each and every sample collected shall indicate that the airborne structure concentration is less than 0.01 structures per cubic centimeter or the background level whichever is greater and the average structure concentrations inside the Work Zone shall not be statistically larger than the average of ambient levels as determined by the Z-test.

F. The method of sampling shall be aggressive or non-aggressive depending on the requirements of applicable regulations. The method of analysis for pre-abatement and during abatement shall be NIOSH 7400 using Phase Contrast Microscopy (PCM). Transmission Electron Microscopy (TEM), in accordance with Appendix A to Subpart E-Interim TEM Analytical Methods and SED requirements, shall be used to analyze all post-abatement samples for this project. The testing laboratory shall be a member of the Environmental Laboratory Approval Program (ELAP).

G. In case of failure of the initial final air clearance monitoring, the work zone will be retested following immediate recleaning. This process will be repeated as necessary until final air clearance is obtained. All costs and expenses resulting from the additional recleaning and retesting (including sampling and analysis) due to failure of the initial final air clearance shall be borne by the Contractor. The expenses thereby incurred will be deducted from any monies due or that may become due to the Contractor.

H. The Contractor shall provide security personnel to watch the decontamination facility and all points of potential access to the Work Zone.

- END OF PART 1 -

PART 2 - PRODUCTS

2.01 Air Filtration Unit

A. Use only Air Filtration Units in compliance with ANSI Z9.2 (1979), Local Exhaust Ventilation. The final filter in each unit shall be of the HEPA type. Use only Air Filtration Units certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles.

B. Equip the system with the following:

1. An automatic shutdown that will stop the fan in the event of a rupture in the HEPA filter or blocked air discharge;

2. Warning lights and/or alarms to indicate an excessive pressure drop across the filters or an insufficient pressure drop across the filters;

3. A non-resettable elapsed time meter to indicate the total accumulated hours of operation;

4. A gauge or manometer to measure the pressure drop across the filter.

2.02 Asbestos Caution Signs

A. Use Asbestos Caution Signs as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k). Posting of warning signs in and around the work site should be in cooperation with the Department of Correction and with approval by the Department of Correction.

2.03 Asbestos Caution Labels

A. Use Asbestos Caution Labels as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k).

2.04 Disposal Bags

A. Use Disposal Bags which are a minimum six (6) mil in thickness, clear in color and preprinted with the Asbestos Caution Label.

2.05 Encapsulating Material

A. All Encapsulating Materials shall be approved by UL for use in class 1A buildings and shall have composite fire and smoke hazard ratings as tested under procedure ASTM E- 84, NFPA 255 and UL 723

Flame Spread	25
Smoke Developed	50

B. If the removal of fireproofing materials is included in this Contract, select an encapsulant from those approved by UL for use with the new fireproofing. If Retro-Guard Type RG or RG-1 manufactured by W.R. Grace & Co. is to be applied, use American Coatings 22P & 22 Powerlock, or Fiberlock Fiberset FT and Fiberset PM, or Certane 909 and 1000, or H.B. Fuller 32-60 and 32-61, or IPC Serpliflex and Serpiloc.

2.06 Equipment

A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed and shall be safe, proper, and sufficient for the purpose intended.

B. All electrical equipment shall be in compliance with the National Electric Code. Attention is specifically called to Article 305 Temporary Wiring.

2.07 First Aid Kits

A. Maintain adequately stocked first aid kits in the Clean Room and Work Zone, in accordance with OSHA requirements.

2.08 High Efficiency Particulate Air (HEPA) Filters

A. Employ filters which have been individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles, in accordance with Military Standard Number 282 and Army Instructional Manual 136-300-175A. Each filter shall bear a US 586 label to indicate ability to perform under the specified conditions.

B. Each HEPA filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of air flow.

2.09 Glovebags

A. Use only commercially available Glovebags. Use Glovebags constructed of clear fire retardant plastic, which have a minimum thickness of six (6) mil.

B. Use Glovebags appropriately sized for the pipe. Use Glovebags, the dimensions of which exceed the pipe insulation diameter by a factor of four (4).

2.10 Plastic

A. Use only new fire retardant plastic sheets of polyethylene, which has a minimum thickness of 6 mil, true grade.

B. For the initial floor protective layer use only new reinforced plastic sheets of polyethylene, which has a minimum thickness of ten (10) mil, true grade. As an alternative, apply a ten (10) mil thick layer of "Spray-Poly" by Isotek or as approved.

2.11 Plywood

A. Use only fire-rated CDX plywood, which is at minimum one half inch (1/2") in thickness.

2.12 Respirators

A. Use only respirators approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

2.13 Sealants

A. Use a combination fire stop foam and fire stop sealant. Use Dow Corning Fire Stop Foam and Dow Corning Fire Stop Sealant or as approved. Apply in accordance with manufacturer's recommendations.

2.14 Studs

A. Use only 2" x 4" fire-rated CDX or metal studs.

2.15 Supplied Air System

A. At all times, air supplied to the type "C" respirators shall be Grade "D" Breathable Air as described by OSHA Regulation 29 CFR 1910.134(d)(1), containing less than the following:

Carbon Monoxide:	20 parts per million
Carbon Dioxide:	1,000 parts per million
Condensed Hydrocarbons:	5 milligrams per cubic centimeter
Objectionable odors:	None

B. Provide a minimum of one (1) hour of reserve air for emergency evacuation. Post, in the Work Zone, emergency evacuation procedures to be followed in the event of breathing air system failure. Explain procedures to all workers prior to commencement of the Work.

C. Water content shall be less than 66 parts per million in order to protect the air purification unit. Certify the air quality of the system prior to beginning asbestos abatement Work and every two weeks during asbestos abatement Work by an independent laboratory certified by the American Board of Industrial Hygiene. Collect samples under the supervision of a Certified Industrial Hygienist. Submit copies of certified test results to the Engineer within five (5) days of the sample collection.

2.16 Vacuums

A. Use only vacuums equipped with HEPA filters.

2.17 Wetting Agents

A. The wetting agent shall be water amended with one (1) oz. of a chemical surfactant per five (5) gallons of water. The composition of the surfactant shall be approximately 50% polyoxyethylene ether and 50% polyoxyethylene esters.

- END OF PART 2 -

PART 3 - EXECUTION

3.01 Personnel Protection

A. Satisfy all applicable Worker protection requirements.

B. Provide protective equipment for use by Workers and designated representatives of the Owner including disposable full body coveralls, respirators and approved cartridges, gloves, hard hats, and goggles. Maintain on site, two (2) sets of protective equipment for the exclusive use of representatives of the owner.

C. At all times, provide all persons with personally issued and marked respiratory equipment suitable for the asbestos exposure level in the Work Zone. Ensure that all persons properly use this equipment at all times.

D. As a minimum, half face negative pressure type respirators must be worn by all personnel during Work Zone preparation. If airborne concentrations of asbestos inside the Work Zone exceed 0.1 fibers per cubic centimeter, employ either PAPR or type "C" respiratory protection whichever is appropriate.

E. PAPRs (Powered Air Purifying Respirators) shall constitute the minimum level of respiratory protection for all persons entering that Work Zone from the time the Work Zone is activated until acceptance.

F. Should airborne concentrations of asbestos inside the Work Zone exceed 2.0 fibers per cubic centimeter, supply all personnel with personally issued and marked Type "C" supplied air respirators operated in the positive pressure demand mode.

G. If the permissible respirators fail to provide sufficient protection against volatile substances emitted by any sealants or other chemicals used, the services of a certified industrial hygienist will be procured, at the Contractor's expense, to determine proper respiratory protection. The Owner will not be liable for the cost of increased respiratory protection.

H. Maintain surveillance of heat stress conditions in the Work Zone. The prevailing Threshold Limit Values (TLVs) for heat stress and the method of heat stress measurement adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) shall govern worker exposure to heat stress.

3.02 Decontamination

A. Construct and operate the Personnel and Waste Decontamination Enclosure Systems in conformance with all applicable rules and regulations. Locate decontamination units outside of the Work Zone.

B. Construct the Personnel Decontamination Enclosure System (PDES) as a series of six (6) completely enclosed and connected rooms: an Airlock, an Equipment Room, a second Airlock, a Shower, a third Airlock, and a Clean (locker) Room. Separate rooms with curtained doorways.

1. Ensure that all egress from the Work Zone is through the PDES.

2. Ensure that all persons leaving the Work Zone vacuum themselves of asbestos in the Work Zone and disrobe in the Equipment Room, shower (including washing of hair) with respirator on, and redress in the Clean Room.

3. Ensure that all persons entering the Work Zone wear clean and new protective clothing and equipment prior to entrance.

4. Equip the Shower with hot and cold water adjustable at the tap, liquid soap, shampoo and disposable towels.

5. Leave all contaminated clothing and equipment in the Equipment Room in barrels or bags. Sanitize respirators in the showers. Equip with fresh cartridges in the Clean Room.

6. No more than one curtained doorway shall be opened at the same time.

C. Remove all asbestos containing waste materials, equipment, or any other materials through the Waste Decontamination Enclosure System (WDES). The WDES shall consist of a series of four (4) completely enclosed and connected rooms: an Airlock, a Washroom, a second Airlock, and a Holding Area. Separate rooms with curtained doorways. Remove materials, waste and equipment as follows:

1. No more than one curtained doorway shall be opened at the same time.

2. Before removing any equipment or asbestos from the Work Zone,

   a. Containerize (or bag) all asbestos;

   b. Wet clean all equipment and packaged asbestos.

3. Place equipment and asbestos in the first Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between the Airlock and the Washroom shall remain closed during this procedure.

4. Uncontaminated Workers in clean new protective equipment shall enter the WDES from outside the Work Zone and enter the Washroom.

5. While in the Washroom:

   a. Remove Waste and Equipment from the first Airlock;

   b. Wet clean all equipment and all packaged asbestos containing waste;

   c. Place bags and other containers into an additional completely clean bag or wrap in plastic. Bags and plastic used for this purpose shall not enter the Work Zone;

   d. Place equipment and asbestos in the second Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between this Airlock and the Holding Area shall remain closed during this procedure.

6. Uncontaminated Workers in clean new protective equipment shall enter the Holding Area from the outside area and remove containerized materials from the airlock.

7. All workers shall proceed into the Work Zone for exiting by way of the PDES. Ensure that personnel do not leave the Work Zone through the WDES.

3.03 Work Zone Preparation

A. Electrical Power: Unless otherwise indicated, shut down all electric power within the Work Zone, as follows:

1. Lock all circuits, which have been shut off, in the off position and label with a printed tag which reads as follows:

"TEMPORARY DISCONNECT
Due to Asbestos Removal Project
DO NOT ACTIVATE THESE CIRCUITS"

2. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide all equipment which must remain operable, as well as all temporary ground-fault interrupter circuits for lights and electrical equipment. Individually protect all power equipment used inside each Work Zone with in-line ground fault interrupters. Locate ground-fault interrupter outside of the Work Zone.

3. Provide all electrical tie-ins and extensions. Provide a temporary panel board, connected to an electric panel designated by the Owner.

B. Heating Ventilation and Air Conditioning (HVAC): Employ all means necessary to prevent contamination and fiber dispersal to other areas of the structure, as follows:

1. Thoroughly clean all HVAC Equipment and ductwork in the Work Zone. Seal all vents within the Work Zone with tape and plastic. Seal all HVAC duct seams. Wrap all ductwork in two (2) layers of plastic.

2. Remove all HVAC filters. Pack disposable filters in sealable double plastic bags for disposal at the approved landfill. Replace with new filters after final cleanup. Wet-clean permanent filters; reinstall after final cleanup.

3. Remove all heating and ventilating equipment grills, diffusers, returns, and other items located on the asbestos bearing surfaces. Wet clean all such items, seal in two (2) layers of plastic and remove from the Work Zone. Reinstall all displaced items after satisfactory clearance air testing.

4. HVAC systems shall be treated as follows:

a. Unless otherwise indicated, shutdown and lockout all heating, ventilating and air conditioning systems. Isolate system at points of entry to the Work Zone; use two (2) layers of plastic.

b. In cases where the HVAC system serving the Work Zone also serves other areas of the building which must remain in operation,

i. Isolate the ductwork entering the Work Zone from the remainder of the system. Cap all ductwork where it passes in or out of the Work Zone with galvanized steel ASTM 5261 in accordance with SMACNA HVAC Duct Construction Standards. Cover with two (2) layers of plastic.

ii. Operate the affected HVAC system twenty-four (24) hours per day from the initiation of Work Zone activation until successful final air clearance. Maintain a positive pressure within the operational portion of the HVAC system of 0.05 inch water gauge or greater with respect to the ambient pressure outside of the Work Zone. Install pressure monitoring devices.

c. In cases where it is necessary for ductwork passing through the Work Zone to remain active, the following conditions are to be maintained:

i. Maintain a positive pressure within the HVAC system of 0.05 inch water gauge (or greater) with respect to the ambient pressure outside of the Work Zone: the conditions for this system shall be maintained and be operational twenty-four (24) hours per day from the initiation of Work Zone preparation until successful final air clearance.

ii. Test, inspect and record the positive pressure in the duct both at the beginning and at the end of each shift.

iii. Monitor the positive pressurization of the duct using instrumentation that will trigger an audible alarm, if the static pressure falls below the set value.

iv. Place the supply air fan and the supply air damper for the active positive-pressurized duct in the manual "on" position to prevent shutdown by fail safe mechanisms.

v. Shut down and lock out the return air fan and the return air dampers.

vi. Cover all active HVAC ducts that pass through the Work Zone with two (2) layers of plastic.

C. Steam Systems: Unless otherwise noted on the Drawings, shut down all steam systems passing through the Work Zone prior to activation.

D. Utilities: Provide all water, electrical and waste facility connections, as well as all sanitary drains. The Contractor will not be charged for water used, electricity consumed, or discharges made to sanitary sewers as a part of this project.

E. Temporary Service Lines: Upon completion of abatement activities, remove all temporary service lines and restore to their original conditions, in a manner acceptable to the Engineer. Repair any part of the permanent service lines, equipment and building facilities disturbed or damaged as a result of the installation or removal of the temporary service lines.

F. Temporary Heating: Provide temporary heating in the Work Zone, as needed to maintain a minimum temperature of 50°F. Heating equipment shall be approved by the Engineer.

G. Movable Objects: Before Work is initiated, clean all items which can be removed without disrupting any asbestos material. Pre-clean movable objects within the proposed areas using HEPA filtered vacuum equipment an/or wet cleaning methods as appropriate; remove such objects from Work Zones to a temporary location, as directed by the Engineer.

H. Fixed Objects: Pre-clean non-removable objects within the proposed Work Zones, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with two (2) layers of plastic sealed with tape.

I. Openings: Prior to placing plastic on walls, floors and ceilings, seal off all openings, including, but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the Work Zones, with two (2) layers of plastic sealed with tape.

J. Floor, Wall and Ceiling Penetrations: Prior to any abatement activities fire stop all openings or penetrations that have not already been sealed. This includes both empty holes, expansion joints and holes accommodating items such as cables, pipes, ducts, conduit, etc.

K. Fire Exits: Maintain emergency and fire exits from the Work Zones, or establish alternative exits satisfactory to the local fire officials. Provide panic exit devices for security and egress. Establish this exit in accordance with all applicable codes and regulations.

L. Signs: Outside of the perimeter barrier and at all entrances and exits to the Work Zone, post signs in English, Spanish and any other language spoken at the project location.

1. The signs shall read:

DANGER
ASBESTOS

CANCER AND LUNG DISEASE HAZARD

Authorized Personnel Only

Respirators and Protective Clothing are Required In This Area

2. Demarcate the regulated area. Post signs at such a distance from the area that an employee will read these signs before entering the area.

M. All of the above procedures shall be completed prior to the disturbance of any asbestos containing material.

3.04 Engineering Controls

A. Maintain the Work Zone at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.05 inches of water.

B. From the start of abatement activities:

1. Operate air filtration units continuously during the project, twenty-four (24) hours a day, from the start of abatement through successful clearance air monitoring, in accordance with "Specifications and Operating Procedures for the Use of Negative Pressure Systems for Asbestos Abatement", Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA Report Number 560/5-85-024 (1985).

2. Install the air filtration units in quantities and locations as required in order to achieve the required negative pressure.

3. Provide a minimum of one air change every ten (10) minutes for the area under negative pressure. Assume Air Filtration Units will operate at 50% of their rated capacity. Maintain on site, one (1) spare air filtration unit for every five (5) in use.

4. Locate the exhaust unit(s) so that makeup air enters the Work Zone primarily through the Decontamination Systems and traverses the Work Zone as much as possible. Provide the specified number of air changes throughout the Work Zone. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or exhaust duct with tape.

5. Whenever possible, exhaust air filtration units to the outside of the building away from occupied areas in such a manner so that the air intake ports, louvers, or entrances for the building or adjacent buildings will not be adversely affected. In cases where it is impossible to exhaust outside of the building, provide a second air filtration unit in series. For runs longer than 150 feet install additional air filtration units every 150 feet.

6. Use ducting, of equivalent or larger dimension as that of the air filtration unit exhaust port, to exhaust to the outside of the structure. Ducts shall exhaust, at minimum fifty (50) feet from all intakes or entrances to the building or adjacent buildings. Seal and brace all ductwork. Maintain airtight joints. Prevent fiber release into uncontaminated building areas.

7. Place the air filtration system exhaust ducts overhead in an inconspicuous, non-restricting fashion. Connect the ducts to a 14" flange, as shown on the Drawings.

8. All filters shall be accessible from the Work Zone or contaminated side of the barrier. Prior to initial use, replace all filters in air filtration units in the presence of the Engineer with new and unused filters.

9. Use a dedicated power supply for the air filtration units.

10. In the event of loss of negative pressure or electric power to the negative pressure ventilating units, stop all abatement Work immediately. Do not resume Work until power is restored and negative pressure equipment is operational. Under no circumstances shall any Asbestos abatement take place without having the negative air pressure system fully operational.

11. When loss of negative pressure equipment lasts or is expected to last longer than one-half hour:

    a. Seal airtight all auxiliary make-up air inlets;

    b. Seal all Decontamination Systems airtight after the evacuation of all personnel from the Work Zone;

    c. All adjacent areas will be monitored by the Engineer at the Contractor's expense for asbestos fiber concentration.

12. Use ventilation smoke tubes to check the system performance.

13. Monitor and record the pressure differential between the Work Zone and the outside of the Work Zone with a monitoring device incorporating a continuous recorder (e.g. strip chart). Equip with an audible alarm which will signal if the pressure differential drops below 0.05 inches of water.

3.05 Asbestos Removal

Floor Tile and Mastic and Window Caulking and Glazing Removal

Work in this part shall be performed in accordance with ICR 56.

The sequence of abatement activities shall be as follows:

1. The areas worked on shall be unoccupied and blocked off to uncertified personnel with barricade tape and with asbestos warning signs. Only certified personnel will be allowed in the abatement areas during work and up until the time clearance air tests are passed.

2. Construct remote Decontamination Units for personnel and waste in accordance with NYS DOL ICR-56. Use studs, sixteen inches on center, covered with plywood and two (2) sheets of plastic.

3. Construct isolation barriers. Where feasible, use existing walls and partitions. Where necessary, frame temporary partitions with studs sixteen (16) inches center on center. To support plastic for all areas larger than thirty-two (32) square feet, except where one of the dimensions is less than one (1) foot, reinforce temporary partitions with plywood. Test the negative pressure system to insure that the 0.05 inch differential is present.

4. Establish negative air as per ICR 56-7 for a large project. The negative pressure ventilation units shall be checked on a daily basis for clogging and if need be, replace filters. The exhaust shall continue to exhaust outside the building.

5. Operation of negative pressure which shall be maintained at all times in the work areas during the asbestos abatement work to ensure the contaminated air in the work areas does not filter back to an uncontaminated area.

6. Negative air shall be established within the work zones at four (4) air changes per hour, minimum, and maintained for the duration of the removals.

7. Cover all interior surfaces of the Work Zone with a layer of plastic sealed with tape. Cover floors first (where needed) so that plastic extends at least twelve (12) inches up on walls, then cover walls with plastic to the floor level, thus overlapping the floor material by a minimum of twelve (12) inches. Tape plastic sheets wall covering to plastic sheets floor covering. Seams in floor plastic shall be folded 2-3 times and taped flat. The plastic shall be attached with adhesives, furring strips and screws, tape, staples, etc., sufficient to prevent collapse or sagging of any plastic covering. **Inspect all plastic three times a day for sagging and repair all such sags or failures immediately.**

8. Install a second layer of plastic on all interior Work Zone Surfaces. Repeat procedure detailed above in step 7.

9. Secure a source of water within the Work Zone (other than the Shower within the Decontamination Zone) for wetting and cleaning.

10. Test the negative pressure system prior to any abatement actions to insure that the 0.05 inch differential is present. Wait twelve (12) hours. Test system again. If the test results are acceptable to the Engineer, the Work Zone will be activated. Do not disturb Asbestos-containing materials prior to activation.

11. Wet all Asbestos prior to removal using a wetting agent. Maintain asbestos wet until packaged for disposal.

12. Upon detachment from the substrate, directly bag or drop into a flexible catch basin all asbestos containing waste material. If asbestos containing materials are located more than ten (10) feet above the floor, use a dust free enclosed chute. Maximum inclination from the horizontal shall be 60 degrees.

13. Following asbestos removal, the entire work area shall be wet cleaned and HEPA vacuumed.

14. Drying time following abatement can be four (4) hours, minimum.

15. Isolation barriers shall not be dismantled until final clearance sampling has been performed and acceptable results attained. The remaining brown coat shall then be encapsulated prior to vacating the work zone.

16. Air monitoring of each work area shall be conducted in accordance with 56-8. The number of samples required will be dependent on the amount of material being removed.

ALL ACM shall be bagged immediately and brought to the Waste Decontamination Enclosure System. At the Decontamination Enclosure, the bags will be wet wiped and the waste double bagged.

3.06 Encapsulation

A. Apply Encapsulating material using an airless sprayer. Comply with manufacturer's recommendations. The Encapsulating material shall be mixed with contrasting color paint to assure proper application.

3.07 Disposal Practices

A. Wet and properly package all Asbestos prior to removal from the Work Zone via the Waste Decontamination Enclosure System. Remove all residual asbestos from the exterior of any package, drum, bag, or other container of Asbestos prior to removal from the Work Zone. Affix the ASBESTOS CAUTION label, the name of the Owner, the name of the Contractor, the name of any Tenant and the location where generated to all packages, drums, bags or other containers used for Asbestos disposal.

B. Store all Asbestos Waste in a totally secure manner. Transport all Asbestos Waste to the disposal site within seven (7) days after completing the Work of this section or thirty (30) days after removal, whichever comes first.

C. Transport Asbestos Waste through the building at the direction of the Engineer at times designated by the Owner. Use sealed carts.

D. During the transport of Asbestos Waste, on or across public thoroughfares, employ a hauler bearing all required permits for the hauling of asbestos. The haulers shall carry insurance in the same types and amounts as the Contractor. In addition, the hauler shall carry "Sudden and Accidental Pollution Liability Insurance in an amount not less than $1,000,000.

E. Dispose of Asbestos Waste at approved landfill bearing all appropriate licenses and permits for asbestos disposal and operated in compliance with all applicable rules and regulations. The Landfill used shall be dedicated for asbestos materials only and shall not accept any other hazardous substances.

F. Within thirty (30) days of removal from the premises, the Contractor shall provide the Owner with disposal certificate(s) from the approved waste disposal site. Final payment will not be approved until all disposal certificates have been provided.

3.08 Clean-up Procedures

A. Daily, during abatement activities:

1. Clean-up visible accumulations of loose Asbestos Waste whenever a sufficient amount of Asbestos Containing Material to fill a single asbestos waste bag has been removed. Removal all waste materials from the Work Zone at the end of each work shift. Maintain visible material wet until after clean up.

2. Place visible accumulations of Asbestos Waste in containers utilizing non-metallic dust pans and non-metallic squeegees or vacuums.

3. Do not use metal shovels.

4. Wet clean and vacuum all surfaces of the Work Zone on a daily basis.

5. Upon completion of waste removal, wet clean the WDES twice. When the PDES Shower Room alternates as a Washroom, wash the Shower Room immediately with cloths or mops saturated with a detergent solution prior to wet cleaning.

6. Wet clean and vacuum the WDES as appropriate, as a minimum after each shift change and meal break.

7. If excess water accumulates in the Work Zone, stop Work until the water is collected and disposed of properly.

8. If Asbestos Waste is spilled in an elevator shaft:

   a. Immediately evacuate, shut down and isolate all of the elevators in the affected elevator bank.

   b. Place all spilled visible accumulations of Asbestos Waste in clean and unused containers.

   c. Vacuum and wet clean all of the contaminated surfaces in the elevator car and shaft in repetitive cycles until clearance air levels are achieved in the car and at each terminus of the shaft.

B. Final Clearance, The Work Zone will be considered acceptable when it has passed both visual inspections and air testing performed by the Engineer according to the criteria and sequence below:

1. In order to pass each of the visual inspections, the Work Zone and adjacent areas shall be free of all visually apparent asbestos. Any disputes over the results of any visual inspection shall be resolved by the Contractor submitting the results of bulk sample analysis demonstrating the contents of the material in question. Remove all Asbestos materials and all asbestos contaminated materials; non-asbestos materials may remain. The laboratory performing such analyses shall be a regular participant in the ELAP Quality Assurance Program for bulk sample analyses with performance results satisfactory to the Engineer. The Engineer reserves the right to independently verify the bulk results.

2. If the Work Zone is not suitable for acceptance for any reason, promptly perform the Work requested by the Engineer.

3. Keep each Work Zone isolated and posted with ASBESTOS CAUTION and CAUTION KEEP OUT signs until after acceptance.

4. Typical acceptance sequence shall be as follows:

a. After removal of visible accumulations of Asbestos Waste, vacuum all surfaces;

b. Remove all bagged materials from the Work Site;

c. Wet clean and vacuum all objects and surfaces in the Work Zone;

d. Visual inspection by the Engineer;

e. Encapsulate all plastic within the Work Zone limits, do not encapsulate surfaces from which asbestos was removed;

f. Remove, bag, and remove from the Work Site the first layer of plastic;

g. Vacate the Work Zone for four (4) hours;

h. Wet clean and vacuum all objects and surfaces in the Work Zone for a second time;

i. Visual inspection by the Engineer;

j. Vacate the Work Zone for four (4) hours;

k. Remove, bag and remove from the Work Site the second layer of plastic;

l. Wet clean and vacuum all surfaces in the Work Zone for a third time;

m. Vacate the Work Zone for four (4) hours;

n. Visual inspection by Engineer to verify the absence of Asbestos Waste, dust and or debris;

o. Clearance Air Monitoring;
Clearance air monitoring shall consist of five air samples taken inside of the work area and five air samples taken outside of the work area.

p. Upon successful clearance air testing, encapsulate surfaces from which Asbestos was removed;

q. Wait for encapsulant to dry;

r. Final Acceptance will be granted provided that items a thru n have been met to the satisfaction of the Engineer;

s. Shut down air filtration units (demobilization);

t. Remove the isolation barriers in conjunction with the use of HEPA vacuums;

u. After all Work and decontamination is complete, relocate and secure objects moved to temporary locations in the course of the Work to their former positions and assure that they are in working order.

END OF PART 3 -
- END OF SECTION 02080 -

REPAIRS TO EXISTING CONCRETE GRANDSTANDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Components for repair of existing concrete grandstands including but not limited to:
   1. Replacing existing seating.
   2. Cleaning of existing concrete surfaces.
   3. Patching of concrete surfaces.
   4. Replacing existing expansion and control joints.
   5. New metal railing.
   6. Painting existing concrete surfaces and graphics as indicated.
   7. Painting existing and new metal railings.
   8. Replacing and painting miscellaneous wood trim.

1.3 RELATED SECTIONS

A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

B. Section 05 5213 - Pipe and Tube Railings.

C. Section 09 9113 - Exterior Painting.

1.4 REFERENCES

A. Americans with Disabilities Act (ADA) - ADA Standards for Accessible Design.

B. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A 307 - Specification for Carbon Steel Bolts and Studs (Ordinary Bolts).

D. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.5 DESIGN REQUIREMENTS

A. Provide products in full conformance with all applicable provisions of ICC 300 – Standard for Bleachers, Folding and Telescopic Seating and Grandstands.

B. Structural Performance: Provide components that will meet the following design loads when installed as detailed:
   1. Seats:
      a. Live Load: 100 psf gross horizontal projection.
      b. Lateral Sway Load: 24 plf seat plank.
      c. Perpendicular Sway Load: 10 plf seat plank.
      d. Live Load of Seat and Tread Planks: 120 plf.
   2. Railings: Refer to Section 05 5213 - Pipe and Tube Railings.

C. Shop Connections: Welded and capable of carrying stress put upon them.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.
   1. Manufacturer's data sheets on products to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.

d. Provide products in full conformance with applicable provisions of ICC 300 Standard for Bleachers, Folding and Telescopic Seating and Grandstands.

B. Welding certificates.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer must have three (3) years of experience in the manufacture of bleachers and grandstands components of the type and size specified.

B. Welders: AWS certified. Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum.".

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to scheduled commencement of installation and associated work, conduct a meeting at the project site with the installer, Construction Manager, manufacturer's representative and any other persons directly involved with the performance of the Work. The Contractor shall record conference discussions and to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to the Work.

1.9 MOCK-UP(S)

A. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.

B. Cleaning Surface to be repaired: Total of 5 foot (1.5 m) square area.

C. Crack Injection: Prepare one sample of each type of injection.

D. Horizontal Surface Repair: Total of 5 foot (1.5 m) square area, demonstrating each type of repair.

E. Vertical Surface Repair: Total of 5 foot (1.5 m) square area, demonstrating each type of repair.

F. Locate mock-up(s) where directed by the Consruction Manager

G. Re-work mock-up(s) until satisfactory to Architect.

H. Satisfactory mock-up(s) may remain as part of the work.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1. Protect all components and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.11 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.

1.12 WARRANTY

A. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ALUMINUM BENCH SEAT

A. Width: 9-1/2".

B. Thickness: 1-3/4".

C. Support: 4-1/8" "Z" bracket.

D. Total Rise: 1'-4-3/4".

E. Material: Mill finish Aluminum.

F. Product: Model "SS9 as manufactured by National Recreation Systems; 888.568.9064; sales@bleachers.net

2.2 CLEANING MATERIALS

A. Degreaser:
   1. Manufacturers:
      a. SpecChem, LLC; Orange Peel-Citrus Cleaner: www.specchemllc.com/#sle.

B. Detergent: Non-ionic detergent.

2.3 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

A. Manufacturers:
   1. SikaQuick EZ Patch, Sika Corporation, Lyndhurst, NJ 07071, 800.933.7452.

2.4 JOINT SEALANTS

A. Refer to Section 07 9200 - Joint Sealants.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.6 GALVANIZED STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for, installation tolerances, and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CLEANING EXISTING CONCRETE

A. Surface must be clean and sound. Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.

B. Preparation work should be done by high pressure water blast, scabbler, or other appropriate mechanical means. Obtain an exposed aggregate surface with a minimum surface profile of ± 1/8" (3 mm) (CSP-6) on clean, sound concrete.

C. Provide enclosures, barricades, and other temporary construction as required to protect adjacent work from damage.

D. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
   1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
   2. Clean out cracks and voids using same methods.

E. The following are acceptable cleaning methods, in order from gentlest to less gentle:
   1. Increasing the water washing pressure to maximum of 400 psi.
   2. Adding detergent to washing water; with final water rinse to remove residual detergent.

3. Steam-generated low-pressure hot-water washing.

F. Do not use any of the following cleaning methods, unless otherwise indicated:
1. Brushes with wire bristles, grinding with abrasives, solvents, hydrochloric or muriatic acid, sodium hydroxide, caustic soda, or lye.
2. Soap or detergent that is not non-ionic.

3.3 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

A. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry.

B. Substrate should be Saturated Surface Dry (SSD) with clean water prior to application. No standing water should remain during application

C. Follow bonding agent and repair mortar manufacturer's written installation instructions.

D. Apply coating of bonding agent to entire concrete surface to be repaired.

E. Priming
1. Reinforcing steel: Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning. Steel shall be fully exposed and have all corrosion removed. Prime the reinforcement with a stiff bristle brush or spray. coat all steel surfaces, allow to dry and then apply a second coat at same coverage
a. Product: Sika® Armatec® 110 EpoCem (consult PDS). Use for Horizontal Slope.
b. Produce: SikaQuick VOH. Use for Vertical.
c. Produce: Sika® Armatec 110 EpoCem (consult PDS). Use for Full Depth Patching.
2. Concrete Substrate: Prime the prepared substrate with a stiff bristle brush or spray. Primer must be applied well into substrate, filling all pores and ensure complete coverage of all surface irregularities.
3. Patching Coat:
a. Product: SikaQuick®-1000. Use for Full Depth Patching

3.4 FIELD QUALITY CONTROL

A. Owner:
1. An independent testing agency, as specified in Section 01 4000, will perform field inspection and testing.

B. Contractor:
1. Contractor shall retain the services of the concrete patching manufacturer's field technician for a minimum of three (3) field inspections as follows:
a. Completion of removals prior to application of product.
b. Fifty (50%) completion of the installations.
c. Completion of the installation.
2. Manufacturer's shall provide a written report after each inspection to Architect, Construction Manager, and Contractor.

3.5 ADJUSTING AND CLEANING

A. Clean installed seats on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.

3.6 PROTECTION

A. Protect installed products until completion of project.
1. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Concrete paving and walks are specified in Division 32.

C. Section 03 3020: Concrete Slab on Grade.

D. Section 03 3025: Concrete Slab on Metal Deck.

E. Section 31 6329: Concrete Drilled Piers.

F. Waterproofing is specified in Division 7.

1.2 DESCRIPTION OF WORK

A. This section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. ACI 117 “Specification for Tolerances for Concrete Construction and Materials”
2. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete."
3. ACI 301 "Specifications for Structural Concrete for Buildings."
4. ACI 303 "Guide to Cast-in-Place Architectural Concrete Practice."
5. ACI 304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete"
6. ACI 305 "Hot-Weather Concreting."
7. ACI 306 "Cold-Weather Concreting."
8. ACI 311 "ACI Manual of Concrete Inspection" and "Guide for Concrete Plant Inspection and Testing of Ready-Mixed Concrete."
9. ACI 315 "Details and Detailing of Concrete Reinforcement."
10. ACI 318 "Building Code Requirements for Structural Concrete."
11. ACI 347 "Guide to Formwork for Concrete."
12. ACI SP-15 "Field Reference Manual." A copy of this publication shall be kept in the field office at all times during concrete construction.
13. AWS D1.4 "Structural Welding Code - Reinforcing Steel."
14. CRSI "Manual of Standard Practice."
15. NYSDOT "Standard Specification for Construction and Materials."

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA’s “Certification of Ready Mixed Concrete Production Facilities.”

C. Source Limitations: To minimize irregularities in appearance or color, obtain cementitious materials of the same brand from the same manufacturer’s plant. Obtain aggregates, admixtures, and water for each type of concrete construction exposed to view in completed project from same source for duration of that type of construction.

D. Mockups: For architecturally exposed concrete finishes, cast sample panels in nonexposed locations for review and acceptance by Architect.

1. Use materials, joints, surface finish, texture, tolerances, and standard of workmanship which are to be used in exposed areas.
2. Architecturally exposed concrete shall be considered to include exposed concrete except in service spaces such as mechanical rooms, electrical rooms, and other utilitarian spaces.
3. Build panel approximately 100 square feet in location indicated or as directed by Architect.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to Engineer and Architect to perform material evaluation tests and evaluate concrete mixes prior to submitting.
   1. Testing Agency shall be qualified according to ASTM C 1077 and ASTM E329.

B. Submit concrete testing service qualifications demonstrating experience with similar projects.

C. Require concrete supplier to provide delivery tickets for each truckload of concrete. Tickets shall be presented to and reviewed by Contractor and Special Inspector or Testing Agency prior to discharging concrete into structure.
   1. Tickets shall contain project identification name, name of Contractor, name of concrete supplier, location of batch plant, date and time of concrete batching, truck number, delivery ticket number, concrete type and class, concrete mix number, design compressive strength at 28 days, concrete mix proportions and materials, and amount of total mix design water that can be added at site prior to discharging into structure if total mix design water was not used when batched. See Part 3 of this section for maximum water amount that can be added at site.

D. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture and the Special Inspector will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion of reinforcement for a given section of work so they may determine if site observations are required. If site observations are required, do not place concrete until RDPs have had opportunity to observe reinforcement.

1.6 SUBMITTALS

A. Shop Drawings:
   1. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Show bar sizes, lengths, material grade, schedules, spacing, diagrams of bent bars, arrangements of reinforcement, splices and laps, mechanical connections, and supports for reinforcement. Include special reinforcement required for openings through concrete.
      a. Show elevations of reinforcement for all members at minimum 1/4 inch = 1 foot scale.
      b. Show locations of construction and control joints.
      c. Reference Contract Drawing number and addendum number in each shop drawing.
      d. Do not place reinforcing information from more than one design discipline (structural, civil, landscape) in each drawing.

B. Mix Designs: Submit proposed mix designs for concrete 15 days minimum before start of concreting. Submittal must be in the Concrete Mix Design Submittal Form at end of this section for each class of concrete.

C. Submit to Special Inspector and Engineer material certificates signed by manufacturers certifying each material complies with specifications. Submit proposed admixtures including chloride ion content prior to submitting mix design.

D. Submit data and installation instructions for proprietary materials.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials so as to preserve their quality and fitness for work.

1. Store reinforcement and formwork in manner to prevent bending, damage (including damage to coatings) and accumulation of dirt.

2. Store waterstops in a manner to prevent exposure to moisture, sunlight, dirt, oil, and other contaminants.

1.8 WORKMANSHIP

A. Contractor shall be responsible for correction of concrete work not conforming to specified requirements, including strength, tolerances, and finishes. Correct deficient concrete as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed/plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown in drawings. Plywood materials shall be one of the following:

1. Overlaid plywood complying with U.S. Product Standards PS 1 "A-C or B-B High Density Overlaid (HDO) Concrete Form," Class 1, exterior grade or better.

2. Plywood complying with U.S. Product Standard PS 1 "B-B (Concrete Form) Plywood," Class 1, exterior grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns and Supports: Metal, fiberglass-reinforced plastic, or paper or fiber tubes that will provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide paper or fiber tubes of laminated plies with water-resistant adhesive and wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum.

E. Form Release Agent: Provide commercial formulation form-coating compounds with maximum VOC of 450 g/l that will not bond with, stain, or adversely affect concrete surfaces or impair subsequent treatments of concrete surfaces requiring bond or adhesion or impede wetting of surfaces to be cured with water or curing compound.

1. Formulate form release agent with rust inhibiter for steel form-facing materials.

F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off, metal form ties, designed to prevent form deflection and spalling concrete upon removal. Provide units that will leave no metal closer than 1 inch to exposed surface.

1. Provide ties that will leave holes no larger than 1-inch diameter in concrete surface when removed.

2. Furnish ties with integral water-barrier plates or washers to walls indicated to receive dampproofing or waterproofing.

3. Unexposed concrete: “Type A-3 Snap Tie Standard” by Dayton Superior or accepted equivalent.

4. Exposed concrete: “Type B1 Two Strut Coil Tie” or “Type B1/B3 Screw-on Coil Tie,” with coil

bolts and plastic cones at each end, by Dayton Superior, or accepted equivalent. Provide "Type B30 Screw-on Plastic Cone or A54 Coil Cone Concrete Plugs," by Dayton Superior, or accepted equivalent; color as selected by Architect.

5. Provide galvanized or stainless-steel ties for concrete elements that are reinforced with epoxy-coated or galvanized reinforcing.

6. Internal wood spreaders are prohibited.

2.2 REINFORCING MATERIALS

A. Deformed bars: ASTM A 615, Grade 60.

B. Deformed bars to be welded, ASTM A 706.

C. Deformed Epoxy-Coated Reinforcing Bars: ASTM A 775.

D. Deformed Galvanized Reinforcing Bars: ASTM A 767, Class I.

E. Deformed Stainless-Steel Reinforcing Bars: ASTM A 955.

F. Steel Wire: ASTM A 82, plain, cold-drawn steel.

G. Epoxy-coated Wire: ASTM A 884.

H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

I. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

J. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type or all plastic-type supports complying with CRSI specifications. Use chairs with sand plates or horizontal runners where base material will not support chair legs.

1. Concrete bricks may be used to support footing reinforcing. Stagger brick locations.

a. Do not use clay bricks.

b. Do not use bricks to support epoxy-coated or galvanized reinforcing.

2. Supports for epoxy-coated reinforcing shall be either wire bar-type coated with epoxy, plastic, or vinyl compatible with concrete for a minimum distance of 2 inches from the point of contact with reinforcing or all plastic-type.

3. Supports for galvanized reinforcing shall be either galvanized wire bar-type or all-plastic type.

4. Finish (epoxy-coated or galvanized) for supports formed from reinforcing bars shall match the finish of the supported reinforcing.

5. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are plastic-protected (CRSI, Class 1) or stainless-steel protected (CRSI, Class 2).

K. Minimum 16-gauge annealed tie wire, ASTM A 82.

1. Provide coated tie wire for use with epoxy-coated or galvanized bars. Acceptable coatings include epoxy, nylon, or vinyl. Galvanized tie wire may be used with galvanized bars. Do not use plain tie wire.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Aggregates: NYSDOT-approved, Section 703 (normal weight), one source and as specified.

1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.

2. Coarse Aggregate: Clean, uncoated, processed aggregate free from clay, mud, loam, or foreign matter.

a. For footings, foundation walls, piers, grade beams, basement walls, retaining walls, and interior walls, blend of NYSDOT size 1 and 2 (25 percent size 1 and 75 percent size 2) or gradation conforming to ASTM C 33, size 467:

Sieve Size	Percent Passing
2 inch	100
11/2 inch	95 to 100
3/4 inch	35 to 70
3/8 inch	10 to 30
No. 4	0 to 5

b. For other applications, blend of NYSDOT size 1 and 2 (40 percent size 1 and 60 percent size 2) or gradation conforming to ASTM C 33, size 57:

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	95 to 100
1/2 inch	25 to 60
No. 4	0 to 10
No. 8	0 to 5

c. No size requirement for stair-pan fill and lean concrete.

C. Water: ASTM C 94, clean, fresh, drinkable.

D. Fly Ash: ASTM C 618, Type F, with a loss on ignition of less than 6 percent.

E. Ground-Granulated, Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2.4 ADMIXTURES

A. Air Entraining: ASTM C 260.

B. Water-Reducing Admixture: "Eucon WR-75" or "Eucon WR-91" by Euclid Chemical Co.; "MasterPozzolith 200" by Master Builders; or "Plastocrete 161" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type A, and not contain more chloride ions than in municipal drinking water.

C. Water-Reducing and Retarding Admixture: "Eucon Retarder-75" by Euclid Chemical Co; "MasterSet R100" by Master Builders; or "Plastiment" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type D, and not contain more chloride ions than in municipal drinking water.

D. Noncorrosive, Nonchloride Accelerator: ASTM C 494, Type C or E, and not contain more chloride ions than in municipal drinking water.

E. High-Range, Water-Reducing Admixture (Superplasticizer): "Eucon 37" by Euclid Chemical Co. or "Sikament SPMN" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type F or G, and not contain more chloride ions than in municipal drinking water.

F. Nonchloride Waterproofing Admixture: "KIM - Krystol Internal Membrane" by Kryton International Inc.; "Xypex Admix C-500, C-1000, or C-2000" by Xypex Chemical Corporation; or "Anti-Hydro – NC or NCR Waterproof Concrete" by Anti-Hydro International, Inc.; "MasterLife 300D" by Master Builders and "Eucon Vandex AM-10" by Euclid Chemical Co.

G. Nonchloride Waterproofing Admixture: "Hycrete W500" by Hycrete Inc. to be added to foundation wall and footing concrete at the Gym Addition.

H. Prohibited Admixtures: Calcium chloride, thiocyanates, and admixtures containing more than 0.05 percent water-soluble chloride ions by weight of cement or more than 0.3 percent thiocyanates by weight of

cement shall not be permitted.

2.5 RELATED MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces a square yard when dry and complying with AASHTO M 182, Class 2.

B. Curing-Sheet Materials: One of the following moisture-retaining covers, complying with ASTM C 171. Waterproof paper, polyethylene film, or polyethylene-coated burlap.

C. Clear Curing and Sealing Compound (VOC compliant): ASTM C 309, Type 1, Class B with minimum 15 percent solids content. Use "Diamond Clear VOX" by Euclid Chemical Co. or accepted equivalent.

D. Horizontal Joint Sealants: “MasterSeal SL2” by Master Builders; “Sikaflex-2c SL” by Sika Corp.; “Eucolastic 2 SL” by Euclid Chemical Co.; or accepted equivalent.

E. Vertical Joint Sealants: “Eucolastic 2NS” by Euclid Chemical Co.; “MasterSeal NP2” by Master Builders; “Sikaflex-2c NS” by Sika Corporation; or accepted equivalent.

F. Joint Filler: ASTM D 1751, ½-inch-thick, premolded, expansion and isolation joint filler strips.

G. Backer Rod: Polyethylene closed-cell foam. “MasterSeal 920 or 921” by Master Builders or accepted equivalent.

H. Self-Expanding Butyl Strip Waterstops: “Waterstop-RX,” 1 inch by 3/4 inch, by CETCO or accepted equivalent at below-grade wall construction joint locations and at locations shown in drawings.

I. PVC Waterstops: Polyvinyl Chloride, dumbbell-type or center bulb-type, conforming to Corps of Engineers CRD-C 572. “Wirestop CR-6380” or “Wirestop FD-6380" by Paul Murphy Plastics Company; “Sealtight PVC Waterstop 6380” by W.R. Meadows; or accepted equivalent at below-grade wall control joint locations and at locations shown in drawings.

J. Chamfer Strips: Provide wood, metal, PVC, or rubber chamfer strips fabricated to provide 3/4-inch chamfer on exposed edges.

K. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.022-inch-thick (26-gauge) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

L. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

M. Sleeves:

1. Schedule 40, PVC for 12-inch diameter or smaller.
2. ASTM A 53, hot-dip galvanized for larger than 12-inch diameter.

N. Anchor Rods and Leveling Plates: Furnished in Section 05 1200 and installed under this section.

O. Non-shrink Grout: Corp of Engineers CRD-C 621. “Sure-Grip High Performance Grout” by Dayton Superior; “NS Grout” by Euclid Chemical Co.; “SikaGrout 212” by Sika Corp.; “Masterflow 928” by Master Builders, Inc.; or accepted equivalent.

P. Bonding Agent: ASTM C 1059, Type II “Acrylic Bonding Agent J40” by Dayton Superior; “SBR Latex” by Euclid Chemical Co.; “Everbond” by L&M Construction Chemicals, Inc.; “SikaLatex” by Sika Corp.;; or accepted equivalent.

Q. Chemical Adhesive for Doweled Reinforcement:

1. Anchors to solid concrete, grouted CMU, solid brick, or stone:
    a. Anchors for use when base material temperature is 0°F or greater: “HIT-Ice” by Hilti; “Epcon A7” by ITW Ramset/Red Head; “AC 100 + Gold” by Powers Fasteners; “AT-XP” by Simpson/Strong-Tie; or accepted equivalent.
    b. Anchors for use when base material temperature is 40°F or greater; “HIT HY 200” by Hilti; “Epcon C6+” by ITW Ramset/Red Head; “PE 1000+” by Powers Fasteners; “ET-HP” by

Simpson/Strong-Tie; or accepted equivalent.

2.6 PROPORTIONING AND MIX DESIGN

A. Prepare design mixtures for type and strength of concrete. Use independent testing facility acceptable to Architect for preparing and reporting proposed mix designs.

B. Where concrete production facility can establish uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed specified design strength by requirements of ACI 318, Section 5.3.2.1 or ACI 301, Section 3.9.

C. When a concrete production facility does not have field-test records for calculation of standard deviation, the required average strength shall be determined in accordance with ACI 318, Section 5.3.2.2.

D. Pozzolans:

1. Pozzolans may be substituted for cement in normal-weight concrete, including fly ash, at a maximum rate of 20 percent by weight or ground-granulated, blast-furnace slag at a maximum rate of 35 percent by weight.

2. Submittals shall include actual mix design, including percentage of pozzolans and test results showing mix meets specified 7-day compressive strength where indicated, 28-day compressive strength, and air content.

3. Protect and heat concrete containing pozzolans during cold-weather conditions. Maintain protection and heat until 70 percent of specified design strength is achieved.

E. Quantity of coarse aggregate in pounds must be in the range of 1.25 to 1.5 times quantity of fine aggregate in pounds.

F. Concrete Quality:

Location	**Required 7-day Compressive Strength psi**	**Required 28-day Compressive Strength psi**	**Maximum Water/Cement Ratio**	**Percent Entrained Air**
Footings, interior stair pans, misc. concrete.	NA	3,000	0.55	4.5*
Retaining walls, foundation walls, piers, drilled piers, underpinning.	3,000	4,000	0.5	4.5*
Lean concrete	NA	1,500	0.65	4.5*

* Plus or minus 1.5 percent.

G. Slump: 3 inches to 5 inches.

1. Concrete containing high-range, water-reducing admixture (superplasticizer) shall have a maximum slump of 9 inches unless otherwise accepted by Engineer.

2. Type G superplasticizer may be added at plant if adequate quality control measures are implemented to verify slump and admixture quantities at plant before addition of superplasticizer. Concrete shall maintain required slump during transportation and placement. Quality control testing at plant shall be performed by an independent testing laboratory employed by Contractor and acceptable to Architect.

3. Ready-Mix Concrete: ASTM C 94.

4. Provide batch ticket for each batch discharged and used in work indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

2.7 REINFORCING FABRICATION

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice." Fabricate bars to required lengths, shapes, and bends. Do not rebend or straighten reinforcement in manner that could weaken material.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine conditions under which concrete shall be placed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 FORMWORK INSTALLATION

A. General: Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347 and ACI 117.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, sleeves, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent concrete mortar leakage.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, etc., for easy removal.

D. Erect forms in logical sequence to allow placement and inspection of reinforcement and other embedded items.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for concrete placement. Securely brace temporary openings, and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

F. Provide cleanout panels at bottoms of deep wall and column forms.

G. Chamfer exposed corners and edges as indicated using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

H. Fit corners and joints with gaskets or tape to prevent leakage.

I. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

J. Sleeves: Provide sleeves in concrete formwork for plumbing, electrical, and mechanical penetrations. Coordinate size and location of sleeves with Contractors and mechanical, electrical, and plumbing drawings.

1. Accurately place and secure in forms.

2. Coordinate sleeve locations with reinforcing bars.

3. Penetrations shall not occur through footings, piers, columns, beams, joists, grade beams, or supported slabs unless shown in structural drawings.

K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove

chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before placing concrete as required to prevent mortar leaks and maintain proper alignment.

L. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable. Apply new form-release agent. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patch forms for exposed concrete surfaces unless approved by Architect.

M. Clean and coat forms before erection. Do not coat forms in place.

N. Place concrete plugs in exposed holes left by form-tie cones.

3.3 STEEL REINFORCEMENT PLACEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust, mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, hangers, or concrete brick as required.

1. Wire-tie intersections as required to prevent displacement of reinforcement.

2. Do not wet set reinforcing bars. Wet setting is not permitted.

D. Place reinforcement to obtain at least minimum concrete coverages for protection of bars. Minimum required concrete cover is noted in drawings.

E. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Use of nails in forms and use of clay brick to support reinforcement is prohibited.

G. Lap bar splices as indicated. Stagger splices in adjacent bars. Wire-tie splices.

H. At points where bars lap-splice, including distribution steel, provide wire-tied minimum lap of 30-bar diameters unless otherwise required.

I. Coordinate placement of reinforcement with openings, including sleeves and other embedded items. Where one or more bars are interrupted, provide additional reinforcement at openings. Additional reinforcement is noted in drawings.

J. Place concrete in manner to ensure alignment of elements remains unchanged.

K. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

L. Galvanized Reinforcement: Repair cut and damaged zinc coatings with zinc repair coating according to ASTM A 780. Use galvanized steel wire ties to fasten galvanized steel reinforcement.

M. Comply with manufacturer-recommended procedures for installing and anchoring of doweled reinforcement using chemical adhesives, including drilling and cleaning of holes and mixing and applying of adhesives.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items including anchor rods, leveling plates, embedded plates, and angles required for other work attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

B. Do not wet set embedded items. Accurately position, support, and secure embedded items against displacing by formwork, construction, or concrete placement operations.

1. Provide No. 3 rebar ties at top and bottom of anchor rods to maintain position or other accepted method.

C. Anchor rods and embedded structural supports incorrectly located or damaged after installation shall be field modified, including repair or replacement, by Contractor.

1. Notify Engineer of defective work. Submit proposed field modifications to Engineer for review and acceptance prior to making corrections.

2. Proposed field modifications shall include design details and calculations, signed and sealed by a licensed Professional Engineer hired by Contractor.

3. Field modifications shall be tested in accordance with Section 05 1200. Perform pull-out tests and other appropriate tests on each repair.

4. Cost of field modifications shall be borne entirely by Contractor at no additional cost to Owner. Contractor shall reimburse Owner for cost of additional testing required.

3.5 INSTALLATION OF NON-STRUCTURAL EMBEDDED ITEMS

A. General: Notify other trades to permit installation of their work, including reglets, conduit, and piping and to coordinate requirements of this section. Cooperate with other trades in setting work as required.

B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings on outer face of exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Install dovetail anchor slots in concrete structures as indicated in drawings.

D. ACI 318, Article 6.3, and guidelines listed below apply to conduit and piping.

1. Do not embed aluminum items unless coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.

2. Other than those passing through concrete elements, do not embed items that are larger than one-third of thickness of concrete element in which they are embedded.

3. Unless shown otherwise in structural drawings, install items as follows:

a. Space at least 12 inches apart and not less than three diameters or widths on center.

b. Place so they do not cross over each other within concrete elements.

c. Place so they do not displace reinforcing bars from their proper location.

d. Provide at least 3/4-inch concrete cover between items and reinforcing bars or concrete surfaces not exposed to weather or in contact with ground. Do not lay items on reinforcing bars. Provide at least 1½-inches concrete cover between items and concrete surfaces exposed to weather or earth.

e. Securely position items by wire tying to support chairs or supports formed from reinforcing bars.

f. Install sleeves at penetrations for nonstructural items passing through concrete elements.

3.6 PREPARATION OF FORM SURFACES

A. General: Coat contact surfaces of forms with an accepted form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or to come in contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

C. Coat steel forms with a nonstaining, rust-preventive material. Rust-stained steel formwork is not acceptable.

3.7 CONSTRUCTION JOINTS

A. Construct joints true to line with faces perpendicular to surface plane of concrete. Locate and install construction joints so strength and appearance of concrete are not impaired, at locations indicated or acceptable to Architect.

1. Provide keyways at least 1-1/2 inches deep in construction joints in walls. Roughen joints

between reinforced concrete walls and footings to a minimum 1/4-inch amplitude and remove dirt and concrete laitance prior to casting concrete walls.

2. Space vertical joints in walls as indicated in drawings. If not indicated, space joints a maximum of 60 feet and locate beside piers integral with walls, near corners, and in concealed locations where possible.

3. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.

4. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

5. Provide water stops in construction joints below grade and where indicated. Install water stops to form continuous diaphragm in each joint. Make provisions to support and protect exposed water stops during progress of work. Field-fabricate joints in water stops in accordance with manufacturer's printed instructions.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement and embedded items is complete and required inspections have been performed.

1. Notify other trades to permit installation of their work. Cooperate with other trades in setting work as required.

B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete" and as specified.

C. A maximum of 2 1/2 gallons for each cubic yard of total mix design water can be added in field. Water must be added prior to discharging and testing concrete. At no time shall total water exceed amount listed in accepted mix design.

D. Deposit concrete continuously in one layer or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within section. Provide construction joints if section cannot be placed continuously.

E. Deposit concrete as nearly as practicable to its final location to avoid segregation caused by rehandling or flowing.

F. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in manner to avoid inclined construction joints.

G. Keep excavations free of water. Do not deposit concrete in water, mud, snow, or on frozen ground.

H. Maximum drop of concrete shall not exceed 5 feet. Use hopper and trunk for greater drops.

I. Maintain reinforcing in proper position during concrete placement.

J. Contractor shall be responsible for controlling the proper placing of embedded pipe, conduit, and other embedded items. See section “Installation of Non-Structural Embedded Items” for additional information.

K. Pumping concrete is permitted only if mix designs specifically prepared and used previously for pumping are submitted. Pump line shall have 5-inch-minimum inside diameter and be used with 5-inch pumps.

3.9 CONSOLIDATION

A. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

B. Do not use vibrators to transport concrete inside formwork.

C. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Vibrators shall penetrate placed layer of concrete at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set.

D. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete

embedment of reinforcement and other embedded items without causing segregation of mix.

E. Do not allow vibrator to come in contact with form.

F. Consolidation is typically not required for self-consolidating concrete mixes. However, provide internal vibration as required to prevent cold joints between pour lifts.

3.10 SURFACE FINISHES

A. Rough-Form Finish: Provide as-cast, rough-form finish to formed concrete surfaces that shall be concealed in finished work or by other construction. Standard rough-form finish is concrete surface having texture imparted by form-facing material used, with tie holes and other defective areas repaired and patched, and fins or other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Form Finish: Provide smooth-form finish for formed concrete surfaces that shall be exposed to view or covered with material applied directly to concrete such as waterproofing, dampproofing, veneer plaster, painting, or other similar systems. Produce smooth-form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish to smooth-form finished concrete surfaces not later than one day after form removal.

1. Moisten smooth-form finished concrete surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.
2. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 CONCRETE PROTECTING AND CURING

A. Protect freshly placed concrete from premature drying, excessive hot or cold temperature, and damage in accordance with provisions of ACI 306 for cold-weather project and ACI 305, for hot-weather protection.

B. Curing Methods: Perform concrete curing in accordance with ACI 308 by wet-curing or moisture-retaining cover curing or combinations thereof as specified.

C. Provide wet-curing by following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water-fog spray.
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges with 4-inch lap over adjacent absorptive covers.

D. Provide moisture-retaining-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair holes or tears during curing period using cover material and waterproof tape.

E. Curing Vertical-Formed Surfaces:

1. Keep forms in place for minimum of 7 days, 14 days in cold weather or until concrete has achieved 70 percent of its design strength.
2. If forms are removed before minimum time period, alternate methods of curing, wet-curing, moisture-retaining-cover curing, or liquid-membrane curing, are required.
    a. Contractor shall submit procedures to Architect for review.
    b. Forms shall remain in place for a minimum of 24 hours when alternating methods of curing

are used. For placement during cold weather, the minimum time to form removal shall be extended based on expected weather conditions and Contractor's submitted procedures.

F. Cure concrete placed under cold-weather conditions completely covering exposed surface of concrete with moisture-retaining cover completely sealed around edges. Cure concrete 14 days minimum with concrete temperature at or above 40 degrees F or 7 days minimum with concrete temperature at or above 70 degrees F.

G. During hot weather after concrete has hardened, loosen form ties, keeping forms in place, and apply water to inside face of form to keep concrete continuously moist.

3.12 COLD-WEATHER CONCRETING

A. Place concrete in accordance with ACI 306.

B. For cold-weather concreting (defined as a period when for more than 3 successive days the mean daily temperature is below 40 degrees F), maintain concrete temperature in accordance with Table 3.1, and maintain concrete protection in accordance with Table 5.3 in "Cold-Weather Concreting" reported by ACI Committee 306.

C. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain concrete mixture temperature recommended in Table 3.1 of ACI 306.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

3.13 HOT-WEATHER CONCRETING

A. Place concrete in accordance with ACI 305.

B. Cool ingredients before mixing to maintain concrete temperature below 85 degrees F at time of placement.

C. Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water.

D. Cover reinforcing steel with water-soaked burlap if temperature of reinforcing steel exceeds ambient air temperature.

E. Wet forms thoroughly before placing concrete.

F. Fog-spray forms and reinforcing steel just before placing concrete.

G. Use water-reducing, retarding admixture when required by high temperature, low humidity, or other adverse placing conditions when acceptable to Architect.

3.14 CONCRETE SURFACE REPAIRS, PROTECTION, AND CLEANING

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after form removal when acceptable to Architect.

1. Cut out honeycombs, rock pockets, voids over 1/2 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but not to a depth of less than 1 inch. Make edges of cuts perpendicular to concrete surface. Thoroughly clean, dampen with water, and brush-coat area to be patched with bonding agent. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so patching mortar will match surrounding color when dry. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. These include surface defects such as color, texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form-tie holes, and fill with dry-pack

mortar or precast-cement cone plugs secured in place with bonding agent.

1. Where possible, repair concealed formed surfaces containing defects affecting concrete durability. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces for smoothness, and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using template having required slope.

1. Repair finished unformed surfaces containing defects affecting concrete durability. These include surface defects such as crazing, cracks, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

D. Repair methods not specified above may be used subject to acceptance of Architect.

E. Protect exposed concrete from staining, laitance, and contamination during remainder of construction period.

F. Clean exposed concrete surfaces after finish treatment to remove stains, markings, dust, and debris. Wash and rinse surfaces in accordance with concrete finish instructions. Protect other work from staining or damage due to cleaning operations. Do not use cleaning materials or processes that could change the appearance of the exposed concrete finish.

3.15 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades unless otherwise shown or directed after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown in drawings. Coordinate sizes and locations with equipment supplied. Prior to placing concrete, set anchorage devices for machines and equipment using setting drawings, templates, diagrams, instructions and directions furnished with the equipment.

D. Steel-Pan Stairs: Provide concrete fill for steel-pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown in drawings. Screed, tamp, and finish concrete surfaces as scheduled.

3.16 TOLERANCES

A. Footings:

1. Variation of dimensions in plan: plus 2 inches or minus 1/2 inch.

2. Variation of center from specified center in plan: 2 percent of width in direction of variation, plus or minus 2-inches maximum variation.

3. Variation of bearing surface from specified elevation: plus or minus 1/2 inch, unless otherwise specified.

B. Piers and Walls:

1. Variation in cross-sectional dimensions of piers, columns, grade beams, and in thickness of walls: plus or minus 1/4 inch.

2. Variation in plan from specified location in plan: plus or minus 1/2 inch for any member in any location.

3. Deviation in plan from straight lines parallel to specified linear building lines: 1/4 inch for adjacent members less than 20 feet apart or any wall length less than 20 feet; 1/2 inch for adjacent members 20 feet or more apart or any wall length of 20 feet and greater.

4. Deviation from plumb: 1/4 inch for any 10 feet of height; 1 inch maximum for entire height.

5. Variation in elevation from specified elevation: plus or minus 1/2 inch for any member in any location.

6. Deviation in elevation from lines parallel to specified grade lines: 1/4 inch for adjacent members less than 20 feet apart or any wall length less than 20 feet; 1/2 inch for adjacent members 20 feet or more apart or any wall length of 20 feet and greater.

C. Anchor Rods and Sleeves:

1. Variation from specified location in plan: plus or minus 1/4 inch.

2. Variation from specified elevation: plus or minus 1/2 inch.

D. Embedded Items (plates, angles, etc.) other than anchor rods and sleeves:

1. Variation from specified location in plan: plus or minus 1/4 inch.

2. Variation from specified elevation: plus or minus 1/4 inch.

CONCRETE MIX DESIGN SUBMITTAL FORM

Project: Location:

General Contractor: Concrete Supplier:

Mix Design No: Concrete Grade:

Use (Describe):

Methods of Placement (chute, pump, chute and buggy, etc.:

If placing by pumping, verify concrete mix can be pumped distances required in project:

A. DESIGN MIX INFORMATION:

Based on Standard Deviation Analysis:_____ or Trial Mix Design Data:_____

Design Characteristics - Density:_____ pcf; Strength:_____ psi (28-day);

Slump:_____ in. required BEFORE adding superplasticizer (if used)

Slump:_____ in. required AFTER adding superplasticizer (if used)

Entrained Air Content:_____% specified

Materials:

Aggregates: (size; type; source; gradation; specification)

Coarse:_____

Fine:_____

Other Materials: Type Product-Manufacturer (Source)

Cement:_____

Fly Ash:_____ _____

Slag:_____ _____

Admixtures:

Water Reducer:_____

Air-Entraining Agent:_____

High-Range, Water-Reducing Admixtures (superplasticizer):_____

Non-Corrosive Accelerator:_____

Other:_____

B. FINAL MIX DESIGN DATA:

RATIOS

Water _____ lb
Cementitious lb = _____
Materials

Course Agg. _____ lb
Fine Agg. lb =_____

SPECIFIC GRAVITIES

Fine Agg._____

Coarse Agg._____

Other:_____

ADMIXTURES

W.R.:_____ oz. per 100 # Cement

HRWR:_____ oz. per 100 #Cement

Non-Corrosive Accelerator:_____ oz.
Per 100# Cement

A.E.A.:_____ oz. per 100 # Cement

Other:_____ oz. per 100# Cement

MIX PROPORTIONS

	WEIGHT (LBS.)	ABSOLUTE VOL. (CU. FT.)
Cement:	_____	_____
Fly Ash:	_____	_____
Slag:	_____	_____
Fine Aggregate:	_____	_____
Coarse Aggregate:	_____	_____
Water:	_____	_____
Entrained Air:	_____	_____
Other:	_____	_____
TOTALS:	_____	_____

PLASTIC CONCRETE

Initial Slump = _____ in. Air Content = _____%

Final Slump = _____ in. Unit Dry Wt. = _____ pcf

Unit Wet Wt. = _____ pcf

STANDARD DEVIATION ANALYSIS (from experience records):

Number of Test Cylinders Evaluated:_____ Standard Deviation:_____

fcr=fc + 1.34s or fcr=fc +2.33s – 500
(Refer to ACI for increased deviation factor when fewer than 30 tests are available.)

Mix #_____ Job Name_____

C. LABORATORY TEST DATA (HARDENED CONCRETE):

COMPRESSIVE STRENGTH

Age (days)	Mix #1	Mix #2	Mix #3
7	_____	_____	_____
14	_____	_____	_____
28	_____	_____	_____
Other	_____	_____	_____

28-day average compressive strength: _____psi

Mix design proportioned to achieve fcr = fc + 1200 psi (1400 psi for strength higher than 5000 psi at 28 days)

CHLORIDE ION CONTENT: _____

Remarks:_____

_____

NOTE: Fill in all blank spaces. Use-0- (Zero) or N.A. (Not Applicable) where appropriate. See "Design and Control of Concrete Mixtures," 13th Edition by Portland Cement Association, for assistance in completing this form.

D. REQUIRED ATTACHMENTS:

_____Coarse aggregate gradation report and DOT certification
_____ Fine aggregate gradation report and DOT certification
_____ Concrete compressive strength data used for standard deviation calculations
_____ Chloride ion data and related calculations
_____ Rapid chloride permeability test report
_____ Admixture compatibility certification letter

Submitted by
Ready-Mix
Supplier: Name _____

Address _____

_____

Phone Number_____ Date_____

Main Plant Location_____ Miles from Project_____

Secondary Plant Location_____ Miles from Project_____

END OF SECTION 03 3000

CONCRETE SLAB ON GRADE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Section 03 3000: Cast-In-Place Concrete.

1.2 DESCRIPTION OF WORK

A. This section supplements Section 03 3000: Cast-In-Place Concrete, with specific emphasis on concrete slabs on grade. The general requirements of Section 03 3000 pertain to this section unless otherwise specified in this section.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. ACI 302 "Guide for Concrete Floor and Slab Construction."

B. Hold a slab preconstruction meeting at least 14 days prior to initial planned date of slab placement. Discussion shall include subbase preparation, reinforcing and dowel placement, slab joints, concrete mix designs, and procedures for concrete placement, finishing, curing, and protection. Attendees shall include Contractor, Placement Subcontractor, Concrete Supplier, Special Inspector, Testing Agency, Engineer, and Architect.

C. Provide protection from precipitation for vapor retarder and slab subbase prior to slab-on-grade placement. Provide protection for slab on grade from direct exposure to sun, wind, precipitation, and excessive cold or hot temperatures starting during placement and lasting until end of curing period.

1. After curing period, provide protection from precipitation for slab openings (column blockouts, mechanical blockouts, expansion/isolation joints, etc.) to prevent moisture from entering slab subbase.

2. Contractor shall be responsible for cost of repairing slab defects resulting from deficient protection methods.

3. One method of protection is installing roof membrane and roof drains prior to installing vapor retarder, slab subbase, and slab on grade.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Contractor shall secure services of company field advisor from manufacturer of water vapor-reducing admixtures (WVRA) and concrete surface treatment products, including sealers, hardeners, sealants, and finishes. Field advisor shall be certified in writing by manufacturer to be technically qualified in product installation. Personnel involved solely in sales do not qualify. Field advisor shall be present at beginning of installation of product and as required during duration of project for the purpose of:

1. Render technical assistance to Contractor regarding installation procedures of product to satisfy warrantee or guarantee requirements.

2. Provide specialized training in use of product to Contractor's personnel.

3. Verify surface preparation procedures and suitable substrates for material application.

4. Verify proper mixing proportions and procedures for product.

5. Verify proper temperature and other environmental controls.

6. Verify proper tools and application procedures.

7. Verify proper curing and protection of installed product.

8. Familiarize Contractor/Owner/Architect/Engineer with entire system, including inspection techniques.
9. Answer questions that arise.

B. Field advisor shall prepare a written report summarizing information listed above. Submit report to Special Inspector, Contractor, Owner, Architect, and Engineer.

C. Contractor shall be responsible for expenses of field advisor and verifying credentials of advisor.

D. Contractor shall be responsible for the cost of any special procedures required by the manufacturer of WVRA to allow for the placement of slab finishes in advance of the specified minimum time period.

E. WVRA manufacturer's warranty shall include:

1. Term: Minimum of 10 years.
2. Repair and/or removal of failed flooring.
3. Placement of topical moisture remediation system.
4. Replacement of flooring materials equal to quality of original installation including material and labor.

1.6 SUBMITTALS

A. Comply with Section 03 3000.

B. Submit option for slab placement (see Part 3 of this section) and layout of slab joints.

C. Prior to slab placement, submit to Special Inspector and Engineer for information only a written protection program for vapor retarder, slab subbase, and slab on grade.

PART 2 PRODUCTS

2.1 STEEL REINFORCEMENT AND ACCESSORIES

A. Reinforcement: ASTM A 615, Grade 60 for uncoated deformed bars.

1. ASTM A 775 for epoxy-coated, deformed bars.
2. ASTM A 767 Class I for galvanized deformed bars.
3. ASTM A 955 for stainless steel deformed bars.
4. Coatings (epoxy or zinc) applied after fabrication and bending.

B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

C. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

D. Supports for Reinforcement: Use wire bar-type supports complying with CRSI specifications. Use chairs with sand plates or horizontal runners where base material will not support chair legs.

1. Concrete bricks may be used to support reinforcing. Stagger brick locations.
   a. Do not use clay bricks.
   b. Do not use bricks to support epoxy-coated or galvanized reinforcing.
2. Supports for epoxy-coated reinforcing shall be either wire bar-type coated with epoxy, plastic, or vinyl compatible with concrete for minimum distance of 2 inches from point of contact with reinforcing or all plastic-type.
3. Supports for galvanized reinforcing shall be either galvanized wire bar-type or all plastic-type.
4. Finish (epoxy-coated or galvanized) for supports formed from reinforcing bars shall match finish of supported reinforcing.

E. Minimum 16-gauge annealed tie wire, ASTM A 82.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, plain steel wire, with less than 2 percent damaged coating in each 12-inch wire length.

1. Provide coated wire ties for use with epoxy-coated or galvanized bars. Acceptable coatings include epoxy, nylon, or vinyl. Galvanized wire ties may be used with galvanized bars. Do not use plain wire ties.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150. Type II or Type I/II only.

B. Fly Ash: ASTM C 618, Type F, with loss on ignition of less than 6 percent.

C. Ground-Granulated, Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

D. Water: ASTM C 94, clean, fresh, drinkable.

E. Aggregates: NYSDOT-approved, Section 703-02 (normal weight), one source and as herein specified.

1. Fine Aggregate: Coarse, clean, sharp, uniformly graded natural sand free of loam, clay, lumps or other deleterious substances. Less than 10 percent passing No. 100 sieve and less than 3 percent passing No. 200 sieve.

2. Coarse Aggregate: Uniformly graded to 1 1/2 inches, clean, processed, crushed stone with low absorption and free of flat/elongated particles. NYSDOT-approved, size 3A gravel can be used to meet large diameter requirement. Gradation similar to blended NYSDOT Type CA 2 and size 1A or ASTM C 33 Type 57 and Type 8, blended and modified as follows:

Sieve Size	Percent Passing
1 inch	95 to 98.5
3/4 inch	75 to 94
1/2 inch	25 to 50
3/8 inch	10 to 25
No. 4	0 to 10

2.3 ADMIXTURES

A. Air Entraining: ASTM C 260.

B. Set-Control Admixtures: Not permitted.

C. Calcium Chloride: Not permitted.

D. Water-Reducing Admixture: “Eucon WR-75” or “Eucon WR-91” by Euclid Chemical Co.; “MasterPozzolith 200” by Master Builders; or “Plastocrete 161” by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type A, and not contain more chloride ions than in municipal drinking water.

E. Mid to High Range Water Reducer/Finish Enhancer: “MasterPolyheed 997” by Master Builders; “Sikament 686” by Sika Chemical Corp; or accepted equivalent. Admixture shall conform to ASTM C 494 Type A and F and not contain more chloride ions than in municipal drinking water.

F. Integral Water Vapor-Reducing Admixture (WVRA): Sodium silicate admixtures by “Vapor Lock 20/20” by Specialty Products Group (SPG); “Barrier One” by Barrier One, Inc.; “Moxie 1800 Super-Admix” by Moxie International; with the following minimum performance:

1. Water Vapor Transmission: Maximum 0.03 US perms per ASTM E 96.

2. Water Proofing: Maximum 1.0 x 10-8 cm/s per ASTM D-5084.

2.4 RELATED MATERIALS

A. Premolded Joint Filler: Provide resilient and nonextruding, premolded, bituminous fiberboard units complying with ASTM D 1751; 1/2-inch-thick, full slab depth.

B. Construction Joint Form: Square edge form only. Keyed joint not permitted.

C. Semi-Rigid Epoxy Joint Filler for Interior Exposed Slabs: At exposed slabs, seal joints with “Sikadur 51SL” by Sika; “Sure Fil J52” by Dayton Superior; “MM-80P” by Metzger/McGuire; “Euco 700” by Euclid Chemical Co.

D. Semi-Rigid Polyurea Joint Filler for Interior Slabs: At interior slabs to receive broadloom carpet, hardwood, or VCT, seal joints with “Euco QWIKjoint 200” by Euclid Chemical Co.; “Spal-Pro RS 65” by Metzger/McGuire; “Sika Loadflex” by Sika; or accepted equivalent.

E. Cementitious Joint Filler for Interior Slabs (Self-Leveling Topping): At interior slabs to receive rubber-backed carpet, solid vinyl tile, and for all other floor coverings, seal joints with “Ardex K301” by Ardex; “Fast Setting Floor Resurfacer” by Quikrete; “Level-X52” by Edison Coatings; “SLT-HS” by Raeco; or accepted equivalent.

F. Polyurethane Joint Sealant for Exterior Slabs: “Sikaflex-2c SL” by Sika; “MasterSeal SL2” by Master Builders; “Eucolastic 2 SL” by Euclid Chemical Co.; “Urexpan NR-200” by Pecora Corporation; or accepted equivalent.

G. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces a square yard and complying with AASHTO M 182, Class 2.

H. Curing-Sheet Materials: ASTM C 171; waterproof paper, polyethylene film, or polyethylene-coated burlap.

1. For slabs exposed to view, provide one of the following or accepted equivalent:

a. “HydraCure S16" by PNA Construction Technologies.

b. “UltraCure NCF/SUN” by McTech Group.

I. Penetrating Exterior Anti-Spalling Sealer: “Euco-Guard 100” by Euclid Chemical Co. (mixed to 17.5 percent concentration); “MasterProtect H400” by Master Builders; “Aquapel Plus” by L&M Construction Chemicals; or accepted equivalent.

J. Evaporation Retarder: Monomolecular, film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. “Aquafilm J74RTU” by Dayton Superior; “Eucobar” by Euclid Chemical Co.; “MasterKure ER 50” by Master Builders, Inc.; or accepted equivalent.

K. Crack Repair Material: For cracks smaller than 1/8 inch, use “Sika Pronto 19” methacrylate by Sika; “Rapid Refloor” polyurea by Metzger McGuire; or accepted equivalent. For cracks greater than 1/8 inch, use specified joint filler material.

L. Hardener: “Lapidolith” by Sonneborn Building Products or accepted equivalent for exposed slabs.

M. Vapor Retarder: Provide vapor retarder cover over prepared subbase where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154 as follows:

1. Polyolefin not less than 15 mils thick, in compliance with ASTM E 1745 Class A and with a perm rating less than 0.02 perms. “Stegowrap 15 mil Class A” by Stego Industries LLC; “Moistop Ultra 15" by Fortifiber Building Products; “Griffolyn 15 Mil Green” by Reef Industries, Inc.; or “Vapor Block 15” by Raven Industries.

2. Provide manufacturer’s-recommended, pressure-sensitive/water-resistant seam tape and mastic for vapor retarder selected.

2.5 PROPORTIONING AND MIX DESIGN

A. Concrete Quality:

Location	Required 28-Day Compressive Strength (psi)	Approximate Cementitious Materials Content (pounds)	Maximum Water/Cement Ratio	Percent Entrained Air
Interior slabs on grade	3,500	530	0.50 (265 pounds max total water)	2*
Exterior slabs on grade	4,500	611***	0.45	6**

* Do not add air-entraining admixtures. Air entrainment occurs as result of mixing.

** Plus or minus 1.5 percent.

*** Maximum cement content 526 pounds plus 20 percent pozzolans by weight. Minimum cement content 488 pounds plus 20 percent pozzolans by weight.

B. Slump: 5-inch maximum for normal and mid-range, water-reduced mixes.

C. Concrete containing a high-range, water-reducing admixture (superplasticizer) shall have maximum slump of 6 inches unless otherwise accepted by Engineer.

D. Use 564 pounds (6 sacks) maximum of cement for each cubic yard for interior slabs and minimum sand content.

E. Quantity of coarse aggregate in pounds must be in range of 1.25 to 1.5 times quantity of fine aggregate in pounds. Provide minimum of 1,800 pounds of coarse aggregate for each cubic yard of concrete.

F. Pozzolans:

1. Pozzolans may be substituted for cement in normal-weight concrete for interior slabs, including fly ash at a maximum rate of 20 percent by weight or ground-granulated, blast-furnace slag at a maximum rate of 35 percent by weight.
2. Pozzolans shall be used at a rate of 20 percent by weight of total cementitious materials for exterior slabs.
3. Submittals shall include actual mix design, including percentage of pozzolans and test results showing mix meets specified 7-day compressive strength where indicated, 28-day compressive strength, and air content.
4. Protect and heat concrete containing pozzolans during cold-weather conditions. Maintain protection and heat until 70 percent of specified design strength is achieved.

G. Pumping concrete is permitted only if mix designs specifically prepared and used previously for pumping are submitted. Mix designs not previously used for anticipated pump line lengths shall be tested by Contractor to verify suitability for project before use at site. Pump line shall have 5-inch-minimum inside diameter and be used with 5-inch pumps.

H. Provide WVRA for interior slabs where indicated in the Drawings.

1. Where not indicated in the Drawings, Contractor has the option to use WVRA for interior slabs. Contractor shall coordinate with floor installer to provide appropriate floor adhesive for attachment to slabs containing WVRA, and shall review the proposed adhesive materials with the Architect. The optional use of WVRA and compatible floor adhesive shall not incur additional cost to the Owner.
2. Comply with Manufacturer’s recommended dosage rates and procedures.

PART 3 EXECUTION

3.1 GENERAL

A. Examine conditions under which work shall be performed. Do not proceed with work until unsatisfactory conditions are corrected.

B. Whenever possible, air temperature should be rising after concrete placement. Attempt to schedule slab placements according to favorable weather reports.

3.2 OPTION FOR SLAB PLACEMENT

A. For placement of slabs that will be exposed in final structure, place construction and contraction joints as shown in drawings or as recommended by ACI 302 if not shown.

B. For placement of slabs that will be subsequently concealed with an architectural finish material, Contractor has two options. Option 1 is to place slabs with few joints or construction joints only. Option 2 is to place slabs with construction and contraction joint spacings as recommended by ACI 302, “Guide for Concrete Floor and Slab Construction.” Contractor shall submit option to be used and joint layout to Architect and Engineer for review.

C. If Option 1 is selected, shrinkage cracking will likely occur but potential for curling will be reduced. Contractor shall be responsible for repairing cracks and curled areas. If Option 2 is selected, probability of shrinkage cracking will be less but probability of curling will increase. Contractor shall be responsible for repairing cracks and curled areas.

3.3 PRECONCRETE PLACEMENT

A. Just before concrete placement, slab subbase shall be dry.

B. Whenever possible, air temperature should be rising after concrete placement. Attempt to schedule slab placements according to favorable weather reports.

C. Subgrade shall be frost-free.

3.4 EDGE FORMS AND SCREED STRIPS FOR SLABS

A. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surfaces. Provide secure edge forms or screed strips to support strike-off templates or compacting vibrating-type screeds. Wet screeding is not permitted.

3.5 VAPOR RETARDER INSTALLATION

A. Following placement and compaction of subbase, place vapor retarder sheeting with longest dimension parallel with the direction of slab placement.

B. Install vapor retarder in accordance with ASTM E 1643, manufacturer's instructions, and as follows:

1. Lap joints 6 inches, and seal vapor retarder joints with manufacturer- recommended seam tape.
2. Extend vapor retarder up walls and penetrations 4 inches minimum.
3. Seal vapor retarder to walls and penetrations with manufacturer-recommended mastic to form continuous barrier.
4. Repair damaged areas by cutting patches of vapor retarder material and placing to overlap damaged areas by 6 inches each side. Seal each side of patch with seam tape.

C. Remove debris and standing water from vapor retarder prior to slab placement.

3.6 REINFORCEMENT PLACEMENT

A. Place slab reinforcing one-third of slab thickness below top surface of slab. Support reinforcement by metal chairs, runners, bolsters, or concrete brick as required.

B. Dedicate workers to placement of reinforcement to continuously monitor and adjust reinforcement location during concrete placement.

C. Touch up damaged epoxy-coated reinforcement in field after placement with epoxy patching material provided by coating manufacturer.

3.7 ISOLATION JOINTS

A. Construct isolation joints in slabs on grade at points of contact with vertical surface and elsewhere as indicated.

3.8 CONSTRUCTION JOINTS

A. Locate and install construction joints not shown in drawings so as not to impair strength and appearance of structure as acceptable to Engineer.

B. Construction joints in exposed slabs shall be doweled joints.

C. Continue half of bar reinforcement through construction joints in concealed slabs.

3.9 CONTRACTION JOINTS

A. Saw cut contraction joints as soon as possible after finishing, generally within 4 to 16 hours. Make sample cut to determine if concrete surface is firm enough so it is not torn or damaged by blade.

B. Use soft-cut contraction joints. Depth of cut shall be one-fifth of slab thickness with minimum of 1 inch.

C. Obtain permission from Engineer if diamond blade cutting is to be used.

D. Contraction joints in exposed slabs shall be doweled joints.

E. Continue half of bar reinforcement through contraction joints in concealed slabs.

3.10 PLACING CONCRETE SLABS

A. Maximum of 2 1/2 gallons for each cubic yard of total mix design water can be added in field. Water must be added prior to discharging and testing concrete. At no time shall total water exceed amount listed in accepted mix design.

B. Use strip pour methods and mechanical vibratory screed whenever possible.

C. Deposit and consolidate concrete in continuous operation within limits of construction joints until placing of panel or section is complete.

D. Consolidate concrete during placing operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

E. Bring slab surfaces to correct level with a straightedge and strike off. Uniformly slope to drains. Use darbies to smooth surface, leaving it free of humps or hollows. Do not sprinkle water or portland cement on plastic surface. Do not disturb slab surfaces before beginning finishing operations.

F. Maintain reinforcement in proper position during concrete placement operations. See requirements for reinforcement placement.

G. Slab thicknesses shown in drawings are minimum allowable. Maximum allowable thickness shall be 1 inch greater than specified thickness.

H. For floor areas with drains, Contractor shall be responsible for finishing concrete slabs to proper elevations to ensure surface moisture will drain freely to floor drains and no puddle areas exist. Reference elevations shown in drawings.

I. Cost of corrections to provide positive drainage shall be responsibility of Contractor.

3.11 SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerances for floor flatness (F_F) of 15 and floor levelness (F_L) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

B. Float Finish: Apply power float finish to slab surfaces that will subsequently be trowel finished or covered with waterproofing membrane. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating using float blade or float shoes when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or

inaccessible to power units. Check and level surface plane to overall tolerances of F_F 18 and F_L 13, and minimum local tolerances of F_F 13 and F_L 10. Cut down high spots and fill low spots. Uniformly slope surface to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin-film finish-coating system. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation. Surface shall be free of trowel marks, uniform in texture and appearance, and leveled to an overall tolerance of F_F 25 and F_L 20 and minimum local tolerance of F_F 17 and F_L 13 for carpet and ceramic or quarry tile finishes and overall tolerance of F_F 35 and F_L 25 and minimum local tolerance of F_F 25 and F_L 17 for exposed slabs and other finishes. Grind smooth surface defects that would telegraph through applied floor-covering system. Exposed surfaces are to be overtrowelled to "burn" surface to a dense, hard, dark finish.

1. Where test sample area includes multiple floor finishes, more stringent tolerances shall apply to entire test sample area.

D. Nonslip Broom Finish: Apply nonslip, heavy broom finish to exterior concrete slab surfaces. Immediately after trowel finishing, roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

E. Delay finishing as long as possible. Allow bleed water to evaporate before finishing.

F. Finish slabs to specified tolerances given. Patching low spots shall not be permitted. Perform grinding as soon as possible, preferably within 3 days, but not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

3.12 COLD-WEATHER CONCRETING

A. Comply with Section 03 3000.

B. Provide temporary heat with vented heaters only.

C. Use foggers to maintain humidity at 50 percent minimum.

3.13 HOT-WEATHER CONCRETING

A. Comply with Section 03 3000.

3.14 CURING AND PROTECTION

A. Protect freshly placed slabs from premature drying and excessive cold or hot temperature. Maintain without drying at a relatively constant temperature for time period necessary for cement hydration and proper hardening.

B. Cure exterior slabs completely by moist-curing using burlap absorptive cover, soaker hoses, and ponding for at least 7 days. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers. Avoid rapid drying at end of curing period. Allow absorptive cover to remain an additional 3 days.

C. Cure interior slabs by sheet-curing by covering slabs with curing sheet material for 7 days minimum. Avoiding rapid drying at end of curing period. Place curing cover in widest practicable width with sides and ends lapped at least 3 inches and sealed with waterproof tape or adhesive. Immediately repair holes or tears in cover during curing period.

D. Do not allow foot or other traffic over slabs during 7-day curing period.

E. Cure slabs or pads 14 days minimum before placing equipment.

F. Interior Nonexposed Slabs:

1. Place finish toppings, coatings, tile, and other materials to be bonded to slabs when the following have been satisfied:

a. Slabs have cured minimum of 90 days.

b. Acceptable moisture vapor emission and alkalinity test results have been achieved.

c. Acceptable 72-hour Bond Test results have been achieved. Bond test by floor finish installer.

G. Interior Exposed Slabs:

1. Apply two coats of hardener after slabs have cured 28 days minimum at rate of 100 square feet/gallon in accordance with manufacturer's recommendations.

H. Exterior Slabs:

1. Apply penetrating exterior anti-spalling sealer to exterior concrete slabs, walks, platforms, steps, ramps, and curbs according to manufacturer's directions.

3.15 JOINT SEALANT

A. Install joint sealant in exposed construction, isolation, and contraction joints in accordance with manufacturer's recommendations.

B. Clean joints thoroughly before applying sealant.

C. Apply sealant after slabs have cured 90 days minimum.

3.16 REPAIR OF SURFACES

A. Contractor shall be responsible for cost of repairing slab defects.

B. Test surfaces for flatness and level tolerances. Test uniform surfaces sloped to drain for trueness of slope.

C. Correct flatness and levelness defects by grinding or removing and replacing slab. Patching low spots not permitted. Repair areas shall be remeasured and accepted by Owner.

D. Repair cracks only when slab is more than 90 days old. Use crack repair material. For cracks over 1/8 inch, fill crack with oven-dried sand prior to application of crack repair material as recommended by manufacturer. Contractor has option to remove and rebuild areas of cracking. Mask cracks to limit crack repair material to crack only.

E. Repair curling only when slab is more than 90 days old.

F. Curling at slab edges exceeding 1/8 inch when measured with a 10-foot straightedge shall be made level by grinding or planing. Locate straightedge with its end at the slab edge, and measure space between straightedge and slab.

G. If curling exceeds 1/4-inch, level slab by grinding or planing as stated above. In addition, core-drill slab 10 inches from joint at 2-foot intervals, alternating on each side of joint, and inject nonshrink grout to fill void beneath slab.

H. Repair edge spalls occurring from shrinkage cracking or from Contractor's operations with methods acceptable to Engineer.

END OF SECTION 03 3020

CONCRETE SLAB ON METAL DECK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Section 03 3000: Cast-In-Place Concrete.

1.2 DESCRIPTION OF WORK

A. This section supplements Section 03 3000: Cast-In-Place Concrete, with specific emphasis on concrete slabs on metal deck. The general requirements of Section 03 3000 pertain to this section unless otherwise specified in this section.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. ACI 302 "Guide for Concrete Floor and Slab Construction."

B. Hold a slab preconstruction meeting at least 14 days prior to the initial planned date of slab placement. Discussion shall include but not be limited to: reinforcing and dowel placement, slab joints, concrete mix designs, and procedures for concrete placement, finishing, curing, and protection. Attendees shall include the Contractor, Placement Subcontractor, Concrete Supplier, Special Inspector, Testing Agency, Engineer, and Architect.

1. If embedments such as conduit and pipe are to be embedded in slabs on metal deck, the installing Contractor shall also attend the slab preconstruction meeting.

C. Provide protection for the slab on metal deck from direct exposure to sun, wind, precipitation, and excessive cold or hot temperatures starting during placement and lasting until end of curing period.

1. Contractor shall be responsible for cost of repairing slab defects resulting from deficient protection methods.

2. One method of protection is installing roof membrane and roof drains prior to installing slab on metal deck.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 SUBMITTALS

A. Comply with Section 03 3000.

B. Submit layout of slab construction joints for review.

C. Prior to slab placement, submit to the Special Inspector and Engineer for information only a written protection program for slab on metal deck.

PART 2 PRODUCTS

2.1 STEEL REINFORCEMENT AND ACCESSORIES

A. Reinforcement: ASTM A 615, Grade 60, for uncoated deformed bars.

1. ASTM A 775 for epoxy-coated, deformed bars.

2. ASTM A 767, Class I for galvanized deformed bars.

3. ASTM A 955 for stainless-steel deformed bars.

4. Coatings (epoxy or zinc) applied after fabrication and bending.

B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

C. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

D. Supports for Reinforcement: Chairs.

1. Supports for epoxy-coated reinforcing shall be either wire bar-type coated with epoxy, plastic, or vinyl compatible with concrete for a minimum distance of 2 inches from the point of contact with the reinforcing or all plastic-type.

2. Supports for galvanized reinforcing shall be either galvanized wire-bar type or all-plastic type.

E. Minimum 16-gauge annealed tie wire, ASTM A 82.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, plain steel wire, with less than 2 percent damaged coating in each 12-inch wire length.

1. Provide coated wire ties for use with epoxy-coated or galvanized bars. Acceptable coatings include epoxy, nylon, or vinyl. Galvanized wire ties may be used with galvanized bars. Do not use plain wire ties.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II or Type I/II only.

B. Fly Ash: ASTM C 618, Type F, with loss on ignition of less than 6 percent.

C. Ground-Granulated, Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

D. Water: ASTM C 94, clean, fresh, drinkable.

E. Aggregates: NYSDOT-approved, Section 703-02 (normal weight), one source and as specified:

1. Fine Aggregate: Coarse, clean, sharp, uniformly graded natural sand free of loam, clay, lumps or other deleterious substances; less than 10 percent passing No. 100 sieve and less than 3 percent passing No. 200 sieve.

2. Coarse Aggregate: Uniformly graded to 1 1/2-inches, clean, processed, crushed stone obtained from quarried bedrock with low absorption and free of flat/elongated particles. NYSDOT-approved, size 3A gravel can be used to meet large diameter requirement. Gradation similar to blended NYSDOT Type CA 2 and size 1A or ASTM C 33 Type 57 and Type 8, blended and modified as follows:

Sieve Size	Percent Passing
1 inch	95 to 100
3/4 inch	82 to 94
1/2 inch	40 to 68
3/8 inch	20 to 44
No. 4	0 to 10

3. Lightweight Coarse Aggregate: ASTM C 330, Size 3/4-inch to No. 4. Dry unit weight of concrete shall be a maximum 120 pcf from a batch weight of 120 to 124 pcf, presoaked to achieve a damp condition according to ACI 211.2; limit shrinkage to 0.03 percent at 28 days.

2.3 ADMIXTURES

A. Air Entraining: ASTM C 260.

B. Set-Control Admixtures: Not permitted.

C. Calcium Chloride: Not permitted.

D. Water-Reducing Admixture: “Eucon WR-75” or “Eucon WR-91” by Euclid Chemical Co.; “MasterPozzolith 200” by Master Builders; or “Plastocrete 161” by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type A, and not contain more chloride ions than in municipal drinking water.

E. Mid to High Range Water Reducer/Finish Enhancer: "MasterPolyheed 997" by Master Builders; "Sikament 686" by Sika Chemical Corp; or accepted equivalent. Admixture shall conform to ASTM C 494 Type A and F and not contain more chloride ions than in municipal drinking water.

2.4 RELATED MATERIALS

A. Construction Joint Form: Square-edge form only. Keyed joint not permitted.

B. Semi-Rigid Epoxy Joint Filler for Interior Exposed Slabs: At exposed slabs, seal joints with "Sikadur 51SL" by Sika; "Sure Fil J52" by Dayton Superior; "MM-80P" by Metzger/McGuire; "Euco 700" by Euclid Chemical Co.

C. Semi-Rigid Polyurea Joint Filler for Interior Slabs: At interior slabs to receive broadloom carpet, hardwood, or VCT, seal joints with "Euco QWIKjoint 200" by Euclid Chemical Co.; "Spal-Pro RS 65" by Metzger/McGuire; "Sika Loadflex" by Sika; or accepted equivalent.

D. Cementitious Joint Filler for Interior Slabs (Self-Leveling Topping): At interior slabs to receive rubber-backed carpet, solid vinyl tile, and for all other floor coverings, seal joints with "Ardex K301" by Ardex; "Fast Setting Floor Resurfacer" by Quikrete; "Level-X52" by Edison Coatings; "SLT-HS", by Raeco, or accepted equivalent.

E. Polyurethane Joint Sealant for Exterior Slabs: "Sikaflex-2c SL" by Sika; "MasterSeal SL2" by Master Builders; "Eucolastic 2 SL" by Euclid Chemical Co.; "Urexpan NR-200" by Pecora Corporation; or accepted equivalent.

F. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces a square yard when dry and complying with AASHTO M 182, Class 2.

G. Curing-Sheet Materials: ASTM C 171. Waterproof paper, polyethylene film, or polyethylene-coated burlap.

1. For slabs exposed to view, provide one of the following or accepted equivalent:

a. "HydraCure S16" by PNA Construction Technologies.

b. "UltraCure NCF/SUN" by McTech Group.

H. Penetrating Exterior Anti-spalling Sealer: "Euco-Guard 100" by Euclid Chemical Co. (mixed to 17.5 percent concentration); "MasterProtect H400" by Master Builders; "Aquapel Plus" by L&M Construction Chemicals; or accepted equivalent.

I. Evaporation Retarder: Monomolecular, film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. "Aquafilm J74RTU" by Dayton Superior; "Eucobar" by Euclid Chemical Co.; "MasterKure ER 50" by Master Builders, Inc.; or accepted equivalent.

J. Crack Repair Material: For cracks smaller than 1/8 inch, use "Sika Pronto 19" methacrylate by Sika; "Rapid Refloor" polyurea by Metzger McGuire or accepted equivalent. For cracks greater than 1/8 inch, use specified joint filler material.

K. Hardener: "Lapidolith" by Sonneborn Building Products or accepted equivalent for exposed slabs.

2.2 PROPORTIONING AND MIX DESIGN

A. Concrete Quality:

Location	Required 28-Day Compressive Strength (psi)	Approximate Cementitious Materials Content (pounds)	Maximum Water/Cement Ratio	Percent Entrained Air
Normal weight interior slabs on metal deck	3,500	530	0.5 (265 pounds maximum total water)	2*
Lightweight interior slabs on metal deck	3,500	611	0.5 (300 pounds maximum total water)	2**
Exterior slabs on metal deck	4,500	611****	0.45	6***

* Do not add air-entraining admixtures. Air entrainment occurs as a result of mixing.

** Air-entraining admixtures may be added to lightweight concrete that is pumped. Entrained air content shall not exceed 4 percent.

*** Plus or minus 1.5 percent.

**** Maximum cement content 526 lbs plus 20 percent pozzolans by weight.

Minimum cement content 488 lbs plus 20 percent pozzolans by weight.

B. Slump: 5-inch maximum for normal and mid-range, water-reduced mixes.

C. Concrete containing a high-range, water-reducing admixture (superplasticizer) shall have maximum slump of 6 inches unless otherwise accepted by Engineer.

D. Use 564 pounds (6 sacks) maximum of cement a cubic yard for interior normal weight concrete slabs and minimum sand content.

E. For normal-weight concrete, quantity of coarse aggregate in pounds must be in range of 1.25 to 1.5 times quantity of fine aggregate in pounds. Provide minimum of 1,800 pounds of coarse aggregate for each cubic yard of concrete.

F. For lightweight concrete, provide minimum 675 pounds of lightweight coarse aggregate (saturated, surface dry) for each cubic yard of concrete.

G. Pozzolans:

1. Pozzolans may be substituted for cement in concrete for interior slabs, including fly ash at maximum rate of 20 percent by weight or ground-granulated, blast-furnace slag at a maximum rate of 35 percent by weight.

2. Pozzolans shall be used at a rate of 20 percent by weight of total cementitious materials for exterior slabs.

3. Submittals shall include actual mix design, including percentage of pozzolans and test results showing mix meets specified 7-day compressive strength where indicated, 28-day compressive strength, and air content.

4. Protect and heat concrete containing pozzolans during cold weather conditions. Maintain protection and heat until 70 percent of specified design strength is achieved.

H. Pumping of concrete is permitted only if mix designs specifically prepared and used previously for pumping are submitted. Mix designs not previously used for anticipated pump line lengths shall be tested

by Contractor to verify suitability for project before use at site. Pump line shall have 5-inch-minimum inside diameter and be used with 5-inch pumps.

PART 3 EXECUTION

3.1 GENERAL

A. Examine conditions under which work shall be performed. Do not proceed with work until unsatisfactory conditions are corrected.

B. Whenever possible, air temperature should be rising after concrete placement. Attempt to schedule slab placements according to favorable weather reports.

3.2 REINFORCEMENT PLACEMENT

A. Place slab reinforcing 1 inch below top surface of slab. Support reinforcement by metal chairs, runners, or bolsters as required.

B. Dedicate workers to placement of reinforcement to continuously monitor and adjust reinforcement location during concrete placement.

C. Touch up damaged epoxy-coated reinforcement in field after placement with epoxy patching material provided by coating manufacturer.

3.3 INSTALLATION OF NON-STRUCTURAL EMBEDDED ITEMS

A. General: Notify other trades to permit installation of their work and coordinate with requirements of this section. Cooperate with other trades in setting work as required.

B. Do not embed aluminum items unless coated to prevent galvanic reaction with concrete and steel.

C. Do not embed conduit or other nonstructural items that are larger than the lesser of the following unless otherwise detailed:

1. One-inch diameter.
2. One-third the thickness of concrete slab above metal deck.

D. Avoid embedding conduit or other nonstructural items wherever possible. If unavoidable, limit size as noted above and install embedded item following the guidelines below.

1. Space at least 18 inches apart.
2. Place so nonstructural items do not cross each other.
3. Provide at least 1-inch concrete cover between items and slab surface. Provide minimum 3/4-inch concrete cover between items and deck, screed angles, edge forms, or reinforcing bars. Do not lay items on deck or reinforcing bars. In exterior slabs, provide at least 1½-inches concrete cover between items and exposed surfaces.
4. Provide at least 1-inch concrete cover between embedded items and shear connectors in composite beam construction.
5. Securely position items by wire tying to support chairs.

E. Items such as trench ducts and electrical floor boxes require special consideration. Known conditions are detailed in drawings. Notify Architect and Engineer of discrepancies or locations not detailed.

F. Install PVC sleeves at plumbing penetrations. Do not core-drill unless accepted by Engineer. Cut deck after slab has cured 28 days or after slab reaches its design strength.

3.4 ISOLATION JOINTS

A. Construct isolation joints in slabs on metal deck at points of contact with vertical surface and elsewhere as indicated.

B. Use two layers of polyethylene film as bond breaker.

3.5 CONSTRUCTION JOINTS

A. Locate and install construction joints so as not to impair strength and appearance of structure as acceptable to Engineer. Locate slab joints and openings through composite slabs no closer than 4 feet to

girder centerlines and 2 feet to beam centerlines.

B. Continue half of bar reinforcement through construction joints.

3.6 PLACING CONCRETE SLABS

A. Place slabs by wet screeding, and verify correct elevation after initial strike off with aid of laser level. Completely "rough-fill" each bay with concrete to remove camber before proceeding with screeding.

B. Maximum 2 1/2 gallons a cubic yard of total mix design water can be added in field. Water must be added prior to discharging and testing concrete. At no time shall total water exceed amount listed in accepted mix design.

C. Place concrete in direction opposite to direction metal deck sheets were placed.

D. Deposit and consolidate concrete in continuous operation within limits of construction joints until placing of panel or section is completed.

E. During placement, avoid overloading metal deck or supporting structural members.

F. Consolidate concrete during placing operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

G. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, leaving it free of humps or hollows. Do not sprinkle water on plastic surface. Do not disturb slab surfaces before beginning finishing operations.

H. Maintain reinforcement in proper position during concrete placement operations. See requirements for reinforcement placement.

I. For floor areas with drains, Contractor shall be responsible for finishing concrete slabs to proper elevations to ensure surface moisture will drain freely to floor drains and no puddle areas exist. Reference elevations shown in drawings.

J. Cost of corrections to provide for positive drainage shall be responsibility of Contractor.

K. Steel floor structure will deflect under weight of wet concrete. Placement of additional concrete may be required after initial wet screeding. Where indicated, camber will reduce but not eliminate need for placing additional concrete. Place varying-thickness concrete slab to maintain required finished-floor elevation. Placement sequence and joint locations are critical and shall be reviewed at slab preconstruction meeting.

3.7 SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, other bonded applied cementitious finish-flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerance for floor flatness (F_F) of 15. Slope uniformly to drains where required. Roughen surface before final set with stiff brushes, brooms, or rakes to produce a profile amplitude of ¼ inch in one direction.

B. Float Finish: Apply power-float finish to slab surfaces that will subsequently be trowel-finished or covered with waterproofing membrane. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Using float blade or float shoes only, begin floating when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check surface plane to overall tolerance of F_F 18 and minimum local tolerance of F_F 13. Cut down high spots, and fill low spots. Uniformly slope surface to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin-film finish-coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation. Surface shall be free of trowel marks, uniform in texture and appearance, and leveled to overall tolerance of F_F 25 and minimum local tolerance of F_F 17 for carpet and

ceramic or quarry tile finishes and overall tolerance of F_F 35 and minimum local tolerance of F_F 25 for exposed slabs and other finishes. Grind smooth surface defects that would telegraph through applied floor-covering system. Exposed surfaces are to be overtrowelled to "burn" surface to dense, hard, dark finish.

1. Where test sample area includes multiple floor finishes, more stringent tolerances shall apply to entire test sample area.

D. Trowel and Fine-Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified. Immediately follow with fine brooming to slightly scarifying surface.

E. Delay finishing as long as possible. Allow bleed water to evaporate before finishing.

F. Finish slabs to specified tolerances given. Patching low spots not permitted. Perform grinding as soon as possible, preferably within 3 days, but not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

3.8 COLD-WEATHER CONCRETING

A. Comply with Section 03 3000.

B. Provide temporary heat with vented heaters only.

C. Use foggers to maintain humidity at 50 percent minimum.

3.9 HOT-WEATHER CONCRETING

A. Comply with Section 03 3000.

3.10 CURING AND PROTECTION

A. Protect freshly placed slabs from premature drying and excessive cold or hot temperature. Maintain without drying at a relatively constant temperature for a period of time necessary for cement hydration and proper hardening.

B. Cure exterior slabs completely by moist-curing using burlap absorptive cover, soaker hoses, and ponding for at least 7 days. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers. Avoid rapid drying at end of curing period. Allow absorptive cover to remain an additional 3 days.

C. Cure interior slabs by sheet-curing by covering slabs with curing sheet material for at least 7 days and avoiding rapid drying at end of curing period. Place curing cover in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair holes or tears in cover during curing period.

D. Do not allow foot or other traffic over slabs during 7-day curing period.

E. Cure slabs or pads a minimum of 14 days before placing equipment.

F. Interior Nonexposed Slabs:

1. Place finish toppings, coatings, tile, and other materials to be bonded to slabs when the following have been satisfied:

   a. Slabs have cured 90 days minimum.

   b. Acceptable moisture vapor emission and alkalinity test results have been achieved.

   c. Acceptable 72-hour bond test results have been achieved. Bond test by floor finish installer.

G. Interior Exposed Slabs:

1. Apply two coats of hardener after slabs have cured 28 days minimum at a rate of 100 square feet/gallon in accordance with manufacturer's recommendations.

H. Exterior Slabs:

1. Apply penetrating, exterior anti-spalling sealer to exterior concrete slabs, walks, platforms, steps, ramps, and curbs according to manufacturer's directions.

3.11 JOINT SEALANT

A. Install joint sealant in exposed construction, isolation, and contraction joints in accordance with manufacturer's recommendations.

B. Clean joints thoroughly before applying sealant.

C. Apply sealant after slabs have cured a minimum of 90 days.

3.12 REPAIR OF SURFACES

A. Contractor shall be responsible for cost of repairing slab defects.

B. Test surfaces for flatness tolerances. Test uniform surfaces sloped to drain for trueness of slope.

C. Correct flatness defects by grinding or removing and replacing slab. Patching low spots not permitted. Repair areas shall be remeasured and accepted by Owner.

D. Repair cracks only when slab is more than 90-days old. Use crack repair material. For cracks over 1/8 inch, fill crack with oven-dried sand prior to application of crack repair material as recommended by manufacturer. Contractor also has option to remove and rebuild areas of cracking. Mask cracks to limit crack-repair material to crack only.

E. Repair curling only when slab is more than 90-days old.

F. Curling at slab edges which exceeds 1/8 inch when measured with a 10-foot straightedge shall be made level by grinding or planing. Locate straightedge with its end at slab edge, and measure space between straightedge and slab.

G. If curling exceeds 1/4-inch, level slab by grinding or planing as stated above. In addition, core-drill slab 10 inches from joint at 2-foot intervals alternating each side of joint, and inject nonshrink grout to fill void beneath slab.

H. Repair edge spalls occurring from shrinkage cracking or from Contractor's operations with methods acceptable to Engineer.

END OF SECTION 03 3025

GLASS-FIBER REINFORCED CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Architectural precast glass-fiber-reinforced concrete urn.

B. Concrete base.

C. Supports, anchors, and attachments.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in Place Concrete.

B. Section 03 3020 Concrete Slab on Grade.

1.4 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

D. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2017.

E. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

F. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

H. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete; 2017.

I. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2013.

J. PCI MNL-128 - Recommended Practice for Glass Fiber Reinforced Concrete Panels; 2001.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations, fabrication details, reinforcement, connection details, dimensions, and relationship to adjacent materials.

C. Samples: Submit two samples 12 inch (300 mm) by 12 inch (300 mm) in size illustrating surface color, finish and texture.

D. Manufacturer's Installation Instructions: Indicate surface cleaning instructions.

E. Designer's Qualification Statement.

F. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design units under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in New York.

B. Fabricator Qualifications: Company specializing in performing the work of this section with minimum five (5) years of documented experience.

C. Erector Qualifications: Company specializing in performing the work of this section with minimum three (3) years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle units to position, consistent with their shape and design. Lift and support only from support points.

B. Lifting Device: Capable of maintaining unit shape during manufacture, storage, transportation, erection, and in position for fastening.

PART 2 PRODUCTS

2.1 GLASS-FIBER-REINFORCED CONCRETE UNITS

A. Glass-Fiber-Reinforced Concrete Units: Factory-fabricated, complying with PCI MNL-128, using rigid molds, constructed to maintain unit panel uniform in shape, size and finish.

1. Urn shall be a replication of the existing urn on site urns.
2. Design and fabricate to comply with applicable code(s).
3. Design to withstand dead loads, positive and negative wind loads, and erection forces.
4. Concrete Mix: Of strength to accommodate panel configuration, panel size and weight, and manufacturing criteria. Provide air entrainement admixture.
5. Welding: Comply with AWS D1.1/D1.1M.

2.2 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M Portland Type I - Normal; white color.

B. Concrete Aggregates: ASTM C33/C33M.

C. Reinforcement: Alkali resistant chopped glass fiber rovings specifically formulated for use in concrete, with lengths varying from 1-1/2 to 2 inches (38 to 51 mm).

D. Reinforcement Mesh: 1" x 1" stainless steel.

E. Admixtures: Comply with ASTM C260/C260M, ASTM C494/C494M, and ASTM C618.

F. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.

1. Color(s): As selected by Fuller and D'Angelo P.C. from manufacturer's full range.

2.3 FABRICATION

A. Spray-up concrete mix in multiple passes; maintain consistent quality during manufacture.

B. Place stainless steel mesh and metal framing members in position in mold.

C. Embed anchors, inserts, plates, angles, and other cast-in items as indicated on shop drawings.

D. Fabricate connecting devices, fasteners and accessories necessary for proper installation.

E. Locate hoisting devices to permit device removal after erection.

F. Cure units to minimize appearance blemishes such as non-uniformity, staining or surface cracking.

G. Exposed Non-Galvanized Steel Components: Clean surfaces of rust, scale, grease, and foreign matter; prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

PART 3 EXECUTION

3.1 PREPARATION

3.2 ERECTION

A. Coordinate installation with that of structural supports, backup, and opening framing, if any.

B. Erect units without damage to shape or finish. Replace or repair damaged panels.

C. Erect units level and plumb within allowable tolerances.

D. Site cutting of panels not permitted.

E. Fasten units in place with mechanical connections.

3.3 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Perform water absorption test in accordance with PCI MNL-117.

3.4 PROTECTION

A. Protect installed units from damage.

END OF SECTION

CAST UNDERLAYMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Liquid-applied self-leveling floor underlayment.
   1. Use cementitious type at all locations.

1.3 RELATED REQUIREMENTS

A. Section 01 7000 - Execution: Alteration project procedures; selective demolition for remodeling.

B. Section 03 3000 - Cast-in-Place Concrete for concrete construction and finish.

C. Section 09 6500 - Resilient Flooring for flashing patching.

1.4 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.

B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

C. ASTM C 580 Flexural Strength

D. ASTM D 3931 Bond Strength (concrete).

E. ASTM F-2170 Relative Humidity in Concrete

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

C. Certificate: Certify that products meet or exceed specified requirements.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results of underlayments for compliance with requirements indicated.

E. Minutes of preinstallation conference.

F. Submit certification, in writing, by the finish floor manufacturer, that the cast underlayment is compatible and acceptable for their product.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience who has completed work similar in material, design, and extent to that indicated for this Project.

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented ac-cording to ASTM E 548.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section 01 3000 - Administrative Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F (41 degrees C).

1.8 REGULATORY REQUIREMENTS

A. Conform to New York State Building Codes for combustibility or flame spread requirements.

1.9 MOCK-UP

A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Prepare mock-up in location designated by Fuller and D'Angelo P.C..
   2. Area: 6 ft by 6 ft (2 m by 2 m).
   3. Do not proceed with underlayment work until workmanship of mock-up has been approved by Fuller and D'Angelo P.C.
   4. If Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Demolish and remove mockups when directed.
   7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Mock-up may remain as part of the Work.

1.10 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting underlayments performance.

C. Maintain minimum ambient temperatures of 50 degrees F (10 degrees C) 24 hours before, during and 72 hours after installation of underlayment.

D. During the curing process, ventilate spaces to remove excess moisture.

E. Close areas to traffic during underlayments application and, after application, for time period recommended in writing by manufacturer

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Cementitious Underlayment:
   1. ARDEX Engineered Cements: ARDEX K 15 www.ardexamericas.com.
      a. Locations where finish flooring is specified.
   2. Substitutions: 01 6000 - Product Requirements.

2.2 MATERIALS

A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 4,000 pounds per square inch (_____ MPa) after 28 days, tested per ASTM C109/C109M.
   2. Flexural Strength: Minimum 1000 psi (6.9 MPa) after 28 days, tested per ASTM C348.
   3. Shrinkage: 0.025 - 0.045% @ 28 days when tested in conformance with ASTM C 531 (modified).
   4. Ideal Slump range 11.5” - 12.5” (2” diameter pipe, 4” high).
   5. Bond Strength: 350-400 psi when tested in conformance with ASTM D 3931
   6. “0” VOC content
   7. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch (89 mm).

8. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

B. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch (3 mm) in size and acceptable to underlayment manufacturer.

C. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.

D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.

E. Moisture mitigation: TEC The LiquiDAM®
1. 100% solids epoxy
2. “0” VOC
3. Use for applications reading up to and including 20 lbs. per 1000 sq. ft. per 24 hours vapor emission per ASTM 1869, or 98% Relative Humidity per ASTM F2170.

F. Primer: Manufacturer's recommended type.

G. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

H. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.3 MIXING

A. Site mix materials in accordance with manufacturer's instructions.

B. Add aggregate for areas where thickness will exceed 1/2 inch (12.7 mm). Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.

C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically profile 100% of base slabs to produce a heavily scarified surface profile with an amplitude of 1/4 inch
1. After profiling test substrate by place drop of water, or other means to insure all coatings, sealers etc have been removed. Repeat profiling if necessary.
2. Prepare and clean existing base slabs according to topping manufacturer's written instructions. Fill voids, cracks, and cavities in base slabs.
3. Mechanically remove contaminants from existing concrete that might impair bond of topping.
4. Saw cut existing contraction and construction joints to a depth of 1/2 inch and fill with epoxy joint filler.

C. Install joint-filler strips where topping abuts vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with topping surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips 1/2 inch below topping surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

D. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.

E. Vacuum clean surfaces.

F. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

G. Close former roof and floor openings where items and equipment have been removed and as indicated..

3.3 APPLICATION

A. Start topping application in presence of manufacturer's technical representative.

B. Existing Concrete: Apply epoxy-bonding adhesive, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of 1/16 to 1/8 inch, without puddling. Place topping while adhesive is still tacky

C. Install underlayment in accordance with manufacturer's instructions.

D. Pump or pour material onto substrate. Do not retemper or add water.
1. Pump, move, and screed while the material is still highly flowable.
2. Be careful not to create cold joints.
3. Wear spiked shoes while working in the wet material to avoid leaving marks.

E. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft (1:1000).

F. For final thickness over 1-1/2 inches (38 mm), place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.

G. Place before partition installation.

H. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

I. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of topping, at locations indicated or as approved by Architect.
1. Coat face of construction joint with epoxy adhesive at locations where topping is placed against hardened or partially hardened topping.

J. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before topping develops random contraction cracks.
1. Form joints in topping over contraction joints in base slabs, unless otherwise indicated.
2. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.
3. Construct contraction joints for a depth equal to one-half of topping thickness, but not less than 1/2 inch deep

K. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.4 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer's instructions.

C. Begin curing immediately after finishing topping. Cure by one or a combination of the following methods, according to topping manufacturer's written instructions:
1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.5 JOINT FILLING

A. Prepare and clean contraction joints and install epoxy joint filler, according to manufacturer's written instructions, once topping has fully cured.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install epoxy joint filler full depth of contraction joints. Overfill joint and trim joint filler flush with top of joint after hardening

3.6 FIELD QUALITY CONTROL

A. Placed Material: Agency will inspect and test for compliance with specification requirements.

3.7 REPAIRS

A. Defective Topping: Repair and patch defective topping areas, including areas that have not bonded to concrete substrate

3.8 PROTECTION

A. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

UNIT MASORY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Reinforced concrete unit masonry
B. Concrete Masonry Unit (CMU)
C. Acoustical Masonry Unit
D. Special shapes
E. Concrete Brick.
F. Clay Facing Brick.
G. Mortar and Grout.
H. Reinforcement and Anchorage.
I. Cavity Wall Insulation
J. Flashings.
K. Lintels.
L. Masonry Accessories.
M. Parging

1.3 RELATED REQUIREMENTS

A. Section 04 7200 - Cast Stone.
B. Section 05 5400 - Cold Formed Metal Framing
C. Section 05 5000 - Metal Fabrications: Loose steel lintels.
D. Section 07 1900 - Water Repellents Water repellents of masonry surfaces.
E. Section 07 2500 - Weather Barriers
F. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
G. Section 09 2662 - Gypsum Sheathing.
H. Section 09 9100 - Louvers: (Set in masonry).

1.4 MATERIAL EVALUATION/QUALITY ASSURANCE

A. Preconstruction Testing: Contractor shall employ and pay qualified independent Testing Agency to perform preconstruction testing indicated and other inspecting and testing services required for source and field quality control.
   1. Clay Unit Masonry Tests: For each different clay masonry unit indicated, test units in accordance with ASTM C 67.
   2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content in accordance with ASTM C 140.
   3. Prism Tests: For each type of wall construction indicated, test masonry prisms in accordance with ASTM C 1314.
      a. Contractor shall fabricate prisms under supervision and direction of Testing Agency Representative.
   4. Test mortar composition and properties in accordance with ASTM C 270 if Property Specification is used.

5. Evaluate mortar proportions in accordance with ASTM C 270 if Proportion Specification is used.
6. Test mortar properties for approved mix in accordance with ASTM C780 (Compressive Strength Method) to determine a base line for field mortar tests.
7. Test grout compressive strength in accordance with ASTM C 1019 to demonstrate compliance with ASTM C476, Property Specification.
   a. Contractor shall deliver to Testing Agency accepted CMU for fabrication of test samples.
8. Test self-consolidating grout compressive strength in accordance with ASTM C1019. Test slump flow and visual stability index in accordance with ASTM C1611/C1611M.

B. Testing Agency Qualifications: Independent Testing Agency shall demonstrate to Architect's satisfaction that it has experience and capability to satisfactorily perform testing indicated without delaying progress of work.

C. Contractor shall employ and pay a licensed Land Surveyor to survey foundations for compliance with dimensional tolerances specified in referenced unit masonry standard.

D. Preinstallation Conference: Perform conference at project site to comply with requirements of Division 1 section "Project Meetings."

1.5 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

B. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2015.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2012.

G. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.

H. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.
   1. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2014.
   2. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
   3. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.
   4. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
   5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
   6. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
   7. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
   8. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
   9. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
   10. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
   11. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
   12. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

13. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2008).
14. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2014.
15. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2011.
16. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Reference Contract Drawing number and addendum number in each shop drawing.

C. Submit detailed drawings for stone trim in form of cutting and setting drawings showing sizes, profiles, locations, and anchorages of each stone trim unit required.

D. Shop drawings:
1. Reference Contract Drawing number and addendum number in each shop drawing.
2. Submit detailed drawings for stone trim in form of cutting and setting drawings showing sizes, profiles, locations, and anchorages of each stone trim unit required.
3. Submit shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Show elevations of reinforcement in wall at 1/4"=1'-0" scale

E. Product Data: Submit manufacturer's product data for each different masonry unit, accessory, and other manufactured product indicated including data for masonry units, fabricated wire reinforcement, mortar, grout, masonry accessories, and brick anchors.

F. Samples: Submit four samples of Brick and ground face units to illustrate color, texture, and extremes of color range.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Brick Units: 100 of each type, size, and color combination.

H. Material Data: Submit to Special Inspector and Architect/Engineer certificates for the following signed by manufacturer and Contractor certifying each material complies with requirements.
1. Masonry Units.
2. Each different cement product required for mortar and grout, including name of manufacturer, brand, and type.
3. Integral water repellant used in mortar.
4. Each material and grade indicated for reinforcing bars.
5. Each type and size of joint reinforcement.
6. Each type and size of anchors, ties, and metal accessories.

I. Material Test Reports: Submit to Special Inspector and Architect/Engineer reports from qualified independent Testing Agency employed and paid by Contractor indicating and interpreting test results relative to compliance for the following proposed masonry materials with requirements indicated:
1. Mortar: Property (Proportion) requirements of ASTM C 270.
2. Grout complying with ASTM C 476. Include description of type and proportions of grout ingredients.
3. Masonry units: ASTM C67 and ASTM C140.

4. Field Mortar Base Line Compressive Test: ASTM C780.
5. Efflorescence tests for Brick: ASTM C67.
6. Durability tests for surface-coated brick: ASTM C67.
7. Construction Procedures: Submit cold-weather construction and hot-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
8. Qualification Data: Submit data for firms and persons specified to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Architects and Owners, and other information specified.
9. Grouting Program: Submit proposed grouting program for grouting CMU walls. Grouting shall be in accordance with recommendations of NCMA-TEK 3-2A. Provide grout demonstration panel when proposed grouting techniques do not meet NCMA recommendations.

1.8 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.
   1. Grouting and Reinforcing: All masonry and grouting and reinforcing work shall be performed by masonry craftworkers who have successfully completed the International Masonry Institute (1-800-IMI-0988) training course for Grouting and Reinforced Masonry Construction, or equal.
   2. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
   3. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
   4. Grout Demonstration Panel: If proposed grouting procedures, construction techniques, or grout space limitations do not conform to the requirements of this Specification, a grout demonstration panel is required to be constructed prior to installation of Contract work. Grout demonstration panel must represent actual project and field conditions. After grouting, the panel must be deconstructed to confirm whether filling and adequate consolidation has been achieved. The RDP will determine whether the proposed grouting procedures are acceptable for use for Contract work
   5. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion for given section of work so they may determine if site observations are required. If site observations are required, do not place grout or continue construction of masonry until RDPs have had opportunity to make observations.
   6. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years of documented experience.
   7. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
   8. 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.

1.9 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 10 feet (2.4 m 3.3m) long by 6 10 feet (1.8 m 3.3m) high; include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.

B. Locate where directed.

C. Mock-up may not remain as part of the Work.

D. Build mockup of typical wall area as directed by Architect.

E. Build mockups for the following types of masonry in sizes listed. approximately 96 inches long by 72 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
   1. Each type of exposed unit masonry construction including pre-cast units Typical interior and exterior unit masonry wall, where exposed.
   2. Typical exterior wall with lower corner of window opening framed with stone trim at upper corner of mockup. Make opening approximately 36 inches wide by 36 inches high. Show jamb construction, special coursing and bands.

F. Typical exterior wall with through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).

G. Typical steel stud framing or masonry backup.
   1. Clean exposed faces of mockups with masonry cleaner as indicated.
   2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
   3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   4. Protect accepted mockups from the elements with weather-resistant membrane.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Approval of mockups is for 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.
      a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
      b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
   7. Demolish and remove mockups when directed

H. Grout Demonstration Panel: If proposed grouting procedures, construction techniques, or grout space limitations do not conform to the requirements of this Specification, a grout demonstration panel is required to be constructed prior to installation of Contract work. Grout demonstration panel must represent actual project and field conditions. After grouting, the panel must be deconstructed to confirm whether filling and adequate consolidation has been achieved. The RDP will determine whether the proposed grouting procedures are acceptable for use for Contract work.

I. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion for given section of work so they may determine if site observations are required. If site observations are required, do not place grout or continue construction of masonry until RDPs have had opportunity to make observations

1.10 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.11 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un constructed wythe and hold cover in place.

3. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
4. Stain Prevention: Prevent grout, mortar, and 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.
   a. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
   b. Protect sills, ledges, and projections from mortar droppings.
   c. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   d. 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.
5. Cold-Weather Requirements: 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. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 IMIAC and the following:
   a. When the ambient temperature is within the limits indicated, use the following procedures:
      a) 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
      b) 32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry.
      c) 25 to 20 deg F (-4 to -7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C) if grouting. Use heat on both sides of walls under construction.
      d) 20 deg F (-7 deg C) and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within the enclosures.
      e) Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
         (a) 40 to 25 deg F (4 to -4 deg C): Cover masonry with a weather-resistant membrane for 48 hours after construction.
         (b) 25 to 20 deg F (-4 to -7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h (25 km/h).
         (c) 20 deg F (-7 deg C) and Below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 48 hours after construction.
      f) Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
6. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

a. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
b. Verify moister content in brick. If dry wet bricks prior to installation.
a) Comply with the requirements of IMIAC.

7. Under no circumstances shall masonry installation cease or be delayed due to the weather conditions. Installation shall continue using procedures listed above.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

C. Store masonry units 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 units become wet, do not install until they are dry.
1. Protect concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

F. Deliver pre blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

G. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.13 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Masonry General
1. Unit Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 “Specifications for Masonry Structures” except where exceeded by the requirements of the contract documents.
2. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined in accordance with ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means as acceptable to authorities having jurisdiction.
3. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color or uniform blend within ranges accepted for these characteristics from one manufacturer for each different product required for each continuous surface or visually related surfaces.
4. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

B. Concrete Block: Comply with referenced standards and as follows:

1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on the drawings for specific locations.
    a. Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated in drawings. If not shown in drawings, use length to produce coursing with little or no cutting.
2. Special Shapes: Provide non-standard blocks configured for corners, lintels, “U” block and control joint edges. All corner CMU's shall be pre-formed radiused corners for the full height of the wall.
    a. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
3. Load-Bearing Units: ASTM C90, normal weight.
4. Unit compressive strength, 2,500 psi, minimum average net area.
    a. Weight Classification: Normal weight.
5. Non-Loadbearing Units: ASTM C129.
    a. Normal weight.
    b. Unit compressive strength, 2,500 psi, minimum average net area
    c. Exposed Faces: Special color and texture, See the drawings.
6. Use two cell units for reinforced masonry applications.

C. Acoustical Masonry Unit
1. Sound-absorbing masonry units conforming to meet ASTM C90.
    a. Slots and edges shall be straight and clean
2. Top of the units shall be completely closed and edges of slots and ends of blocks shall be straight and clean.
3. Filler shall be fibrous supplied by Sound Seal shall be installed in the cavities of the blocks at the block plant.
    a. All filler material shall be cut accurately to size and installed as recommended by the manufacturer for the units specified.
4. Class -A Fire Rated Mold and Bacteria Resistant.
5. All units contain manufacturer-approved integral water repellent CMU admixture at the time of manufacture.
6. Size and Special Shapes: 8”, 10” and 12”, right and left-hand units as required.
7. Fire resistance Rating: As indicated on drawings
8. STC: 12” unit .85, painted.
9. Coursing: Stack Bond.
10. Reinforcing bars and grout where indicated.
11. Product: Sound Seal SoundBlox RSC/RF sound-absorbing concrete masonry units.
    a. Manufacturer: Proudfoot Company Box 276 Monroe, CT 06468-0276; Toll Free: 800-445-0034; www.theproudfootcompany.com

D. Concrete Building Brick:
1. For below grade use, ASTM C1634 , normal weight.
2. For other uses, ASTM C55, normal weight.
3. Unit compressive strength, 3,500 psi, minimum average net area.
4. Size:
    a. Standard Modular: 3 5/8 inches wide by 2 1/4 inches high by 7 5/8 inches long.
    b. Oversize: 3 5/8 inches wide by 2 3/4 inches high by 7 5/8 inches long.
5. Economy: 3 5/8 inches wide by 3 5/8 inches high by 7 5/8 inches long.

2.2 BRICK UNITS

A. Manufacturers:

1. **Brick No, 1:** "Lexington Smooth Type 2 Modular Solid", Watsontown Brick Company, P. O. Box 68 Watsontown PA 17777; 570-538-2555; Distributed by Extech Building Materials, Newark, NJ 07105, Att. Joseph Turzilli (973) 230-6356.
2. **Brick No.2**: "Red Flashed Modular Face Brick", Carolina Ceramics Brick Company, 9931, Two Notch Road, Columbia, SC 29223-4390; 803-788-1916; Distributed by Extech Building Materials, Newark, NJ 07105, Att. Joseph Turzilli (973) 230-6356
3. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   a. Color and texture to match Architect's sample.
   b. Use where brick is exposed.
   c. Actual size: Standard Modular: 3 5/8" thick x 2 1/4" high x 7 5/8" long.
   d. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   e. Compressive strength: 3,000, measured in accordance with ASTM C67.
   f. Initial Rate of Absorption: Less than 15 g/30 sq. in. per minute when tested per ASTM C 67.
   g. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
   h. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I; color as required to produce approved color sample.

1. Not more than 0.1 percent alkali.
2. Hydrated Lime: ASTM C207, Type S.
3. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
4. Masonry Cement: Not Permitted.
5. Mortar Cement: ASTM C 1329/C 1329M.
6. Ready Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set controlling admixtures to produce a ready mixed mortar complying with ASTM C 1142.
7. Mortar Aggregate: ASTM C144. For joints less than ¼ inch, use aggregate graded with 100 percent passing No. 16 sieve.
   a. White Mortar Aggregates: Natural white Pigment for Colored sand or ground white stone.
   b. Colored Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
8. Grout Aggregate: ASTM C404.
9. Water: Clean and potable.
10. Integral water repellant.
11. Additives not permitted unless approved by Architect.

B. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M <http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=ASTM%20C979/C979M>.

1. Color(s): As selected by Fuller and D'Angelo P.C. from manufacturer's full range.
2. Manufacturers:

a. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.

C. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
1. Acceptable product: Dry-Block Mortar Admixture; W. R. Grace & Co., Construction Products Division, Mortar Tite; Addiment Inc, Rheopel; Master Builders.
2. Substitutions: See Section 01 2500 Substitution Procedures..

D. Cold-Weather Admixture:
1. Accelguard 80; Euclid Chemical Co.
2. Morseled; W. R. Grace & Co., Construction Products Division.
3. Trimix-NCA; Sonneborn, Div. of ChemRex, Inc

2.4 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
1. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com. <http://www.h-b.com/>

B. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.

C. Recycled Content: Provide minimum 90 percent postconsumer recycled content. For stainless steel products, provide minimum 60 percent postconsumer recycled content.

D. Steel Reinforcing Bars: Material and grade as follows:
1. Billet steel complying with ASTM A 615.
2. Epoxy-coated billet steel complying with ASTM A 615 and ASTM A 775.
3. Grade 60.

E. Deformed Reinforcing Wire: ASTM A 496.

F. Plain-Welded Wire Fabric: ASTM A 185.

2.5 JOINT REINFORCEMENT

A. General: ASTM A951. Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following:
1. Galvanized carbon steel wire, Coating Class as required by referenced unit masonry standard application indicated.

B. Description: 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. Wire Diameter for Side Rods: 0.1483 inch (9 gauge).
2. Wire Diameter for Cross Rods: 0.1483 inch (9 gauge).

C. Single Wythe Masonry Joint Reinforcement: Ladder type; conforming to ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3. 0.148 inch (3.8 mm) side rods with 0.148 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure. Flush weld all keys.
1. Design with perpendicular cross rods spaced not more than 16 inches on center with one side rod in each face shell.
2. Hohmann & Barnard - #220 9 ga Width dependent on application

D. Adjustable Multiple Wythe Masonry Joint Reinforcement: Ladder type; fabricated with moisture drip; stainless steel wire conforming to ASTM A82/A82M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1875 inch (4.8 mm) side rods with 0.1875 inch (4.8 mm) side rods with 0.148 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure. Flush weld all keys.

1. Where bed joints align, provide ladder design with perpendicular cross rods spaced not more than 16 inches on center and number of side rods as follows:
    a. One side rod for each face shell of hollow masonry units more than 4 inches in nominal width, plus one side rod for each wythe of masonry 4 inches or less in nominal width.
    b. Where bed joints do not align, or where there is a combination of CMU and clay masonry wythes, provide either type as follows:
        a) Design with perpendicular cross rods spaced not more than 16 inches on center with one side rod in each face shell of CMU wythes. Provide adjustable two-piece rectangular bent wire ties to connect wythes.
        b) Tab-type ladder design with perpendicular cross rods spaced not more than 16 inches on center with one side rod in each face shell with integral, welded eyelet tabs spaced 16 inches on center to accept double pintle leg rectangular wire ties.
2. Hohmann & Barnard."#270 Ladder LOX-ALL Adjustable Eye-Wire".

E. Adjustable Masonry Veneer Anchors for Connecting To Light Gage Metal backup walls.
1. General: Provide two piece assemblies allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall but resisting tension and compression forces perpendicular to it for attachment over insulation and sheathing to metal studs and with the following structural performance characteristics.
    a. Structural Performance Characteristics: Capable of withstanding a 100-pound load in either tension or compression without deforming over or developing play in excess of 1/16 inch.
    b. Maximum clearance between connecting parts of tie shall be 1/16 inch, consisting of wire tie section and one piece triangular wire ties compatible with anchor section.
2. Anchor Section: Rib-stiffened, sheet metal plate with rib-stiffened, pronged leg construction to bridge wallboard and insulation and bear on metal studs, with screw holes top and bottom, 0.0747 inch (14 gauge) x 1 1/4 inch x 6, fabricated with raised stiffened strap to provide a slot for wire ties.
    a. Stainless-Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless-steel shank.
3. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    a. Hohmann & Barnard Stainless steel, "X-Seal Veneer Anchor" x leg depth as required to suit applications.
    b. Provide Hohmann & Barnard continuous TeXtro-Seal Tape, 40 mil thick dual membrane multi-ply polyurethane/polymer modified asphalt.
    c. Triangular Tie: Hohmann & Barnard, stainless steel Vee Tie (VBT), 3/16" diameter.
        a) Lengths as required to suit applications.

2.6 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this article.

B. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard for application indicated, for wire ties and anchors in exterior walls.
1. Wire Diameter: 0.1875 inch.
2. Mill Galvanized: Class 1 coating.
3. Hot-Dip Galvanized: Class B-2 coating.

C. Steel Sheet: ASTM A1008.

D. Galvanized Heavy-Thickness Steel Sheet: ASTM A 653, G60 (commercial quality) hot-rolled carbon steel sheet hot-dip galvanized after fabrication to comply with ASTM A 525, Class B3, fabricated from steel sheet or strip with a thickness of 0.180 inch and greater, for rigid anchors.

E. Steel Plates and Bars: ASTM A 36, hot-dip galvanized to comply with ASTM A 123 or ASTM A 153, Class B3, as applicable to size and form indicated.

F. Bent Wire Ties
   1. General:
      a. Ties and anchors shall extend at least halfway into veneer or facing wythe but in no case shall extend less than 1-1/2 inches into veneer, and shall have at least a 5/8-inch cover on outside face.
      b. Adjustable ties shall have a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches.
   2. Individual two-piece, rectangular bent wire ties: Composed of rectangular closed end unit with eyes, not less than 4 inches wide, and adjustable, double-pintle, rectangular wire ties.
   3. One piece, rectangular, double-pintle wire ties: For use with tab-type joint reinforcing.
   4. One piece, triangular, dovetail wire tie: With 14-gauge dovetail end for use with dovetail slots.
   5. One piece, triangular wire ties: For use with anchors to structural steel and light-gauge framing.

G. Adjustable Anchors For Connecting Masonry To Steel Or Concrete Framework
   1. General: Two-piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall but resisting tension and compression forces perpendicular to it.
   2. For anchorage to concrete, provide 22-gauge dovetail anchor section formed from galvanized steel sheet, foam filled, and one piece, triangular, dovetail wire-ties.
   3. For anchorage to steel framework, provide manufacturer's standard anchors with crimped 1/4-inch-diameter, wire anchor section for welding to steel and one piece, triangular wire-ties compatible with anchor.
      a. “#359 Weld-On Tie” and “#301W Column Web Tie”, by Hohmann & Barnard. Use #359 FP Weld-On Ties if columns are fireproofed.

H. Rigid Anchors
   1. Provide straps of form and length indicated in drawings, fabricated from galvanized, heavy thickness hot dipped galvanized sheet, 1 1/2 inches wide by 1/4 inch thick with 2-inch bends.
   2. Where rigid anchors are used to bond intersecting walls, strap shall be 24 inches long, plus 2-inch bends at each end.
      a. Use Notched Column # 354 Hohmann & Barnard where indicated

I. Wall Ties: Corrugated formed sheet metal, 7/8 inch (22 mm) wide by 0.05 inch (1.22 mm) thick, stainless steel, sized to provide not more than 1 inch (25 mm) and not less than 1 inch (25 mm) of mortar coverage from masonry face.

J. Corrugated Buck Anchor: Corrugated formed sheet metal, 1-1/4-inch-wide, 4" long, by 0.06 inch thick (16 gauge) , hot dip galvanized to ASTM A153/A153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face
   1. Seismic veneer anchor #345 SV with continuous wire, Hohmann & Barnard

K. Dovetail Anchor: 14 gauge, 1" wide, hot dip galvanized steel designed for fastening to concrete CMU backup.
   1. # 315 Dovetail Anchor, Hohmann & Barnard
   2. Temporarily fill or cover face of opening of slots to prevent intrusion of concrete or debris.

L. Miscellaneous Anchors
   1. Unit-Type Masonry Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.

2. Anchor Bolts: Headed bolts complying with A 307, Grade A, with ASTM A 563 hex nuts and flat washers where indicated. Hot-dip galvanized to comply with ASTM A 153, Class C, of diameter and length indicated.
3. Joint Stabilizing Anchor: Acceptable products include the following:
   a. "Slip-Set Stabilizer" by Hohmann & Barnard, Inc.
   b. "353 Debonded Shear Anchor" by Heckmann Building Products, Inc.
   c. "Control Joint Anchor 1700" by Wire-Bond.
4. Cast Stone Anchors: Refer to Section 04-7200 Cast Stone Masonry.

M. Post-Installed Anchors
1. Chemical Adhesive Anchors:
   a. Anchors to solid concrete, grouted CMU, solid brick, or stone:
      a) Anchors for use when base material temperature is 0°F or greater: "HIT-Ice" by Hilti; "Epcon A7" by ITW Ramset/Red Head; "AC 100 Plus" by Powers Fasteners; "AT Acrylic-Tie" by Simpson/Strong-Tie; or accepted equivalent.
      b) Anchors for use when base material temperature is 40°F or greater; "HIT-HY 200 Safe Set" by Hilti; "Epcon C6" by ITW Ramset/Red Head; "T308 Plus" by Powers Fasteners; "ET Epoxy-Tie" by Simpson/Strong-Tie; or accepted equivalent.
   b. Anchors to hollow masonry (brick or hollow CMU):
      a) Anchors for use when base material temperature is 0°F or greater: "Epcon A7" by ITW Ramset/Red Head; "AC 100 Plus" by Powers Fasteners; "AT Acrylic-Tie" by Simpson/Strong-Tie; or accepted equivalent.
      b) Anchors for use when base material temperature is 40°F or greater: "Epcon C6" by ITW Ramset/Red Head; "T308 Plus" by Powers Fasteners; "ET Epoxy-Tie" by Simpson/Strong-Tie; "HIT-HY 70" by Hilti; or accepted equivalent.
   c. Provide manufacturer's standard screen tubes for use with anchors

2.7 FLASHINGS

A. Flexible Flashing Use only where flashing is fully concealed in masonry.
1. Surface adhered composite membrane flashing: 40 mil. Polymeric, reinforced membrane with Elvaloy KEE, solid-phase plasticizer and flexibilizer added to membrane flashing.
2. Provide adhesives, preformed shapes for outside, inside and end dams. as recommended by the manufacturer.
3. Verify sealants specified in Section 07 9200 - Joint Sealants are compatible with flashing.
4. Termination Bars: 1/8' x 1", stainless steel with foam seal. Use at top of all flashing.
5. Manufacturers:
   a. Hyload, Inc.; Hyload Flashing Membrane
   b. Color as selected by Architect from manufacturer's range of black, gray, tan, or white.

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

C. Drip Edge: For use with membrane flashing at lintels.
1. 3/8-inch, exposed hemmed edge by 2-inch, stainless steel drip edge. Select product compatible with flashing.
2. Subject to compliance with requirements, products that may be incorporated in work include the following:
   a. "DP" by Hohmann & Barnard, Inc.
   b. "Drip Edge" by Johnson Bros.
   c. Drip edge must be adhered to flashing with manufacturer's approved adhesive.
   d. Isolate drip edge from metals other than stainless steel to avoid contact with drip edge.

D. Preformed Flashing:
   1. Inside corners, outside corners, end dams, and jambs are to be pre-formed and compatible with flashing and drip edge.

E. Tin Coated Copper Flashing: ASTM B370, 060 soft annealed; 16 oz/sq. ft. (.0216" mm) thick; natural finish.

F. Prefabricated Metal Flashing: Smooth fabricated 16 oz/sq. ft. (4.88 kg/sq m) tin coated copper flashing for surface mounted conditions.

2.8 ACCESSORIES

A. Rebar Positioners: Steel wire positioners that are seated into the cores of masonry units.
   1. Wire Diameter: 0.1483 inch (9 gauge).
   2. Mill galvanized finish for interior walls.
   3. Hot-dip galvanized finish for exterior walls.
   4. Acceptable products:
      a. "Corelock" by Wire-Bond.
      b. "RB Rebar Positioner" by Hohmann & Barnard.
      c. "No. 376 Rebar Positioner" by Heckmann Building Products.
      d. Other products that are accepted as equivalent.
   5. Nonmetallic Expansion Joint Strips: Premolded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from neoprene.
   6. Preformed Control Joint Gaskets: Solid rubber strips with a Shore A durometer hardness of 60 to 80, designed to fit standard sash block and to maintain lateral stability in masonry wall. Size and configuration as indicated or as required.
      a. Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation M2AA-805.
   7. Bond Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No.
      a. 15 asphalt felt).
   8. 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.
   9. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
      a. Manufacturers:
         a) Hohmann & Barnard, Inc ; RS Series : www.h-b.com/sle. <http://www.h-b.com/sle>
   10. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding; 1/2 inch (- mm) wide by maximum lengths available.
   11. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
      a. Mortar Diverter:
         a) Type: Semi-rigid mesh designed for installation at flashing locations.
         b) Manufacturer: Mortar Net Solution www.mortarnet.com
      b. Mortar Net with insect barrier. Thickness: 1-1/2; www.mortarnet.com.
   12. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
   13. Termination Bars: Stainless steel; compatible with membrane and adhesives.
   14. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

15. Weeps:
    a. Type: Molded PVC grilles, insect resistant.
    b. Manufacturer:
        a) Hohmann & Barnard, Inc: www.h-b.com.
16. Cavity Vents:
    a. Type: Molded PVC grilles, insect resistant.
    b. Manufacturer:
        a) Hohmann & Barnard, Inc: www.h-b.com <http://www.h-b.com>.
            (a) Location in brick cavity
17. Cavity Wall Insulation:
    a. Extruded-Polystyrene Board Insulation: Rigid, cellular, polystyrene thermal insulation with closed cells and integral high-density skin; formed by the expansion of polystyrene base resin with a carbon-black filler in an extrusion process to comply with the following characteristics:
        a) Aged thermal resistance (R-value) for 1-inch thickness of 5.0, deg F x h x sq. ft./Btu at 75 deg F at 5 years.
        b) Compressive strength: 25 as per ASTM D-1621.
        c) Flexural Strength: 75 as per ASTM C-203.
        d) Water Absorption: 0.10 as per ASTM C-272.
        e) Water Vapor Permeance: 0.6 as per ASTM E-96.
        f) Water affinity: Hydrophobic.
        g) Water Capillarity: None. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM C 1314, and as follows:
            (a) Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
                (1) Dimensional Stability: 2.0 as per ASTM D-2126
                (2) Linear Coefficient of thermal expansion: 2.7 x 105.
                (3) Flame Spread: 5 as per ASTM E-84.
                (4) Smoke Developed: 45-175 as per ASTM E-84.
                (5) Oxygen Index: 24 Min. as per ASTM D-2863.
        h) Products: [Owens Corning “High Performance Foamular 250”] 2”x 48”x 96”, T&G, R-10 for metal stud backup application. and 2”x 16”x 96” R-10 for masonry backup application.
18. Cavity Insulation Joint Sealing Tape: Rubber asphalt membrane. 40 mil thick, consisting of 36 mil self-adhering rubberized asphalt membrane laminated to a 4 mil high density polyethylene film and removable release sheet.
    a. Minimum width: 4”
        a) Primer: As recommended by the manufacturer for application over extruded polystyrene insulation.
19. Mortar Grout Screen: ¼” square screen high strength non-corrosive polypropylene polymers.
    a. MSG Hohmann & Barnard, Inc
20. Epoxy Adhesive: Fiber Glast 1101.
    a. MSG Hohmann & Barnard, Inc.

2.9 LINTELS

A. Bond beam Lintels: U shape Type size as indicated on the drawings.

2.10 MASONRY CLEANERS

A. Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use

product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Products:
    a. Cleaners for Red and light-colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:
        a) ProSoCo, Inc. Sure Klean No. 600 Detergent

2.11 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
    1. Do not use calcium chloride in mortar or grout.
    2. Field addition of admixtures is prohibited for self-consolidating grout.

B. Mortar for Unit Masonry: Comply with ASTM C 270, (Proportion) (Property) Specification for job-mixed mortar and ASTM C 1142 for ready-mixed mortar of types indicated below:
    1. Limit cementitious materials in mortar to portland cement-lime.
    2. Use Type S mortar in the following locations:
        a. Walls that are below grade and in contact with earth.
        b. Load-bearing walls.
        c. Exterior, above-grade, non-load-bearing walls and parapets.
        d. Shear walls.
        e. Areas where another type of mortar is not indicated.
    3. Use Type N mortar in the following locations:
        a. Interior non-load-bearing partitions.
        b. Veneers.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
    1. Pigments shall not exceed 10 percent of portland cement by weight.
    2. Pigments shall not exceed 5 percent of mortar cement by weight.
    3. Mix to match Architect's sample.
    4. Application: Use pigmented mortar for exposed mortar joints where indicated on Architectural drawings.

D. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
    1. Mix to match Architect's sample.
    2. Application: Use colored aggregate mortar for exposed mortar joints where indicated on Architectural drawings.

E. Integral Water Repellent Mortar: Provide admixture for all mortar to be used with integral water repellent masonry units. Admixture must be same manufacturer.

F. Grout for Unit Masonry: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm). Slump: 8 to 11 inches. Minimum 28-day compressive strength: 2,000 psi.
    1. Slump: 8 to 11 inches.
    2. Use grout of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

G. Self-Consolidating Grout for Unit Masonry: Comply with material requirements of ASTM C476, and slump flow and VSI per ASTM C1611/C1611M
    1. Slump Flow: 24 inches to 30 inches.

2. Visual Stability Index (VSI) Rating: 1 or less. (Appendix X.1)
3. Minimum strength: 2,000 psi.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions with installer on-site for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry.
   1. For record, prepare written report, endorsed by installer, listing conditions detrimental to performance of unit masonry.
      a. Verify that foundations are within tolerances specified.
      b. Verify that reinforcing dowels are properly placed.
      c. Verify that substrates are free of substances that impair mortar bond.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Examine mechanical vibrators to be used for grout consolidation prior to grout delivery to verify vibrators are in proper working order.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPERATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work or as required by TMS 402/602.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work or as required by TMS 402/602

3.4 PROTECTION OF MASONRY

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un constructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and 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 from mortar splatter by 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.
   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.

3.5 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Flemish bond, match existing.
   2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
   3. Mortar Joints: Concave.
   4. Brick Units:
      a. Bond: Flemish Bond.
      b. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
      c. Mortar Joints: Concave.

3.6 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets.

B. Layup walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry: Lay exposed masonry as follows unless indicated otherwise in drawings:
   1. Flemish Bond.
   2. Do not use units with less than nominal 4-inch horizontal face dimensions.
   3. Avoid use of less-than-half-sized units at corners, jambs, and where possible at other locations.
   4. Where indicated in drawings, match coursing, bonding, color, and texture of new masonry with existing masonry if not Flemish bond.

D. Lay concealed masonry with units in wythe in running bond or bonded by lapping not less than 4 inches.
   1. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch- horizontal face dimensions at corners or jambs.

E. Stopping and Resuming Work: In each course, rack back one-half unit length for one-half running bond or one-third unit length for one-third running bond. Do not tooth. Clean exposed surfaces of set masonry. Wet clay masonry units lightly if required. Remove loose masonry units and mortar prior to laying fresh masonry.

F. Built-In Work: As construction progresses, build-in items specified under this and other sections of 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.
      a. At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated but not less than 3/4 inch to act as thermal break between frame and masonry.
   2. Where built-in items are to be embedded in cores of hollow masonry units, place layer of metal lath in joint below and rod mortar or grout into core.
   3. Fill cores in hollow concrete masonry units with grout three courses (24 inches) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated

G. Build chases and recesses as shown or required to accommodate items specified in this and other sections of specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

H. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to opening.

I. Nonbearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above and as follows.

1. Install compressible filler in joint between top of partition and underside of structure above. Brace top of wall as shown in drawings.

J. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
   1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent mortar and grout leakage. 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.

3.7 INSTALLATION OF MASONRY UNITS

A. General: Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in project.
   1. Masonry units shall be laid true, level, plumb and in uniform coursing in accordance with drawings. Corners and angles shall be square unless otherwise indicated in drawings.
   2. Lay only dry concrete masonry units. Do not wet concrete masonry units unless approved.
   3. Adjust masonry units into final position while mortar is soft and plastic. If units are displaced after mortar has stiffened, remove mortar, clean joints and units, and relay units with fresh mortar.
   4. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual thickness of masonry units using units of nominal thickness indicated.
   5. Use full-sized units without cutting where possible. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction.
   6. Use concrete brick as miscellaneous infill at pockets and elsewhere as needed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

C. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.8 MORTAR BEDDING AND JOINTING

A. Mortar joint at foundation shall not be less than ¼ inch or more than ¾ inch in thickness. Provide full mortar coverage for bed joint at foundation, except do not project mortar into cells to be grouted. Fill head and bed joints of hollow units with mortar for thickness of face shell. Solid units shall have full head and bed joints.

B. Set stone units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone joint surface thoroughly before setting. For stone surfaces that are soiled, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

C. If it is necessary to remove a unit after it has been set in place, remove unit, clean, and set in fresh mortar.

D. Nominal mortar joint thickness shall be 3/8 + 1/8 inch for precision units and 1/2 + 1/8 inch for slumped units.

E. Mortar joints with wire reinforcement shall be at least twice the wire diameter of the wire.

F. Mortar joints shall be straight, clean, and uniform in thickness.

G. Unless otherwise specified or noted in drawings, tool mortar joints with a concave surface except for the following:
   1. Walls to be plastered shall have flush cut or sacked mortar joints.
   2. Walls to be concealed by other materials shall have flush cut joints.

3. For joints facing cavities/air spaces, strike joints flush. No voids allowed.

H. Perform tooling when mortar is partially set but still sufficiently plastic to bond. Tooling shall be performed with a tool that compacts mortar.

I. Place and construct control joints as shown in drawings. Keep joints clean from mortar drippings and other debris.

3.9 INSTALLATION OF REINFORCING STEEL

A. Place reinforcement as detailed in drawings. Secure against displacement prior to grouting. Horizontal bars may rest on cross web of hollow units.

B. Tolerances for placement of reinforcing steel in walls and flexural members shall be as follows:
1. Plus/minus 1/2 inch for depth equal to 8 inches or less.
2. Plus/minus 1 inch for depth equal to 24 inches or less but greater than 8 inches.
3. Plus/minus 1 ½ inches for d equal to 24 inches or less.
4. Plus/minus 2 inches for longitudinal location of reinforcement.

C. Clearance between reinforcing steel and surface of masonry shall not be less than ¼ inch for fine grout and ½ inch for coarse grout.

D. Lap reinforcing bars as shown in drawings.

E. Positioners: Provide positioners to maintain position of vertical reinforcing bars at each lap splice or at maximum spacing of 10 feet, whichever is less. Where these positioners are within ½ inch of surface of masonry, galvanize according to ASTM Standard A 153.

F. Provide continuous bond beams reinforced with two No. 5 bars at floors, roof, and tops of parapets unless otherwise noted. Provide corner bars same size as continuous reinforcing in wall corners and intersections, lapped 2 feet with continuous reinforcing.

G. Provide minimum vertical reinforcing of one No. 5 bar in window and door jambs, at ends of walls, corners, and each side of vertical control joints. Locate bar maximum 16 inches from end of CMU.

3.10 HORIZONTAL JOINT REINFORCEMENT

A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods fully embedded in mortar for their entire length with minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing minimum 6 inches.

B. Install single-wythe horizontal joint reinforcing in concrete masonry veneer at 16 inches on center vertically unless noted otherwise.

C. Provide additional joint reinforcement not more than 8 inches above and below wall openings and extending at least 12 inches beyond openings.

D. Cut or interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

E. Provide continuity at corners by use of prefabricated "L" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

F. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide continuity with:
1. Horizontal joint reinforcement using prefabricated "T" sections.
2. Rigid metal anchors at 48 inches on-center.

3.11 GROUTING

A. General:
1. Use grout to fill masonry. Do not use mortar.
2. Reinforcement must be in place prior to grouting.

3. Install vertical grout dams at maximum horizontal spacing of 30 feet to control horizontal flow of grout. For walls partially grouted, use expanded metal lath mesh or other material that will not interfere with bond to restrict grout into only those cells that are to be grouted.
4. After mortar joints have set, remove protruding mortar fins that excessively constrict grout space.
5. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
6. Grout to 1½ inches below top of masonry units for each lift to form and interlock with subsequent masonry and grouting. Where bond beams occur, stop grout pour minimum 1½ inch below top of masonry. At top of masonry, fill grout space flush with tops of units and consolidate.
7. Solidly grout cells and spaces containing reinforcing steel for partially grouted walls. For solid grouted walls, grout all cells.
8. Consolidate grout using mechanical vibrator, and reconsolidate using mechanical vibrator after excess water is absorbed into masonry units.
    a. Do not consolidate or reconsolidate self-consolidating grout.

B. Low Lift Grouting:
1. Construct masonry wall up to 5 feet 4 inches (vertically) at a time. Minimum height of grout lift creating a cold joint shall equal splice length of reinforcing indicated in drawings.
2. Install vertical and horizontal reinforcing steel, anchors, and embedded items as masonry work progresses.
3. Grout walls in 5 foot 4 inch maximum lifts, consolidating and reconsolidating each lift. Stop grout 1½ inch below top of top course.
    a. Do not consolidate or reconsolidate self-consolidating grout.

C. High Lift Grouting
1. Construct masonry wall up to 24 feet maximum without grouting.
2. Provide cleanout openings at base of wall:
    a. At vertical reinforcing bars.
    b. At spacing of no more than 32 inches on center for solid grouted walls.
    c. At spacing of no more than 48 inches on center for partially grouted walls.
3. Install horizontal reinforcing steel, anchors, and embedded items as masonry work progresses. . Vertical reinforcing steel may be placed during or after wall is constructed, but must be secured in place prior to grouting.
4. Provide positioners to secure vertical reinforcement in correct location.
5. Remove mortar droppings and other debris through cleanouts at base of wall. After cleanouts have been inspected, seal and brace cleanouts.
6. Grout walls in 5 foot - 4 inch maximum lifts, consolidating and reconsolidating each lift.
    a. Do not consolidate or reconsolidate self-consolidating grout.
    b. Alternate Lift Height: Where the following conditions are met, maximum lift height may be increased to 12 foot 8 inches:
        a) Masonry wall must be cured for a minimum of 4 hours.
        b) No intermediate horizontal reinforcing steel (bond beam) is present.
7. If grouting is to be stopped for more than one hour during a pour, stop grout 1½ inch below top of uppermost grouted unit (top of pour). Where additional masonry is to be laid above a given pour, stop grout 1½ inch below top of top course.

3.12 BONDING CAVITY WALLS/MULTIWYTHE MASONRY

A. Bond wythes together using one of the following methods:
1. Individual Two-Piece Wire Ties: Use continuous horizontal joint reinforcing with individual ties installed in horizontal joints spaced not to exceed 16 inches on-center horizontally and 16 inches on-center vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of

openings and space not more than 8 inches on-center around perimeter of openings. Provide two-piece adjustable ties where wythes do not align.

2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
   a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
   b. Where bed joints do not align, use tab-type horizontal joint reinforcing with adjustable one-piece double-pintle wire ties.
      a) Where one wythe is of clay masonry and the other of concrete-masonry, use adjustable-type (two- piece-type) ties.

3.13 ANCHORED MASONRY VENEER TO LIGHT-GAUGE BACKUP WALLS

A. Anchor single-wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:
   1. Fasten each anchor section through sheathing and insulation to metal studs as indicated.
   2. Install Self-Sealing Tape behind anchor sections.
   3. Embed tie section in masonry joints. Provide not less than 2-inch air space between back of masonry veneer wythe and face of sheathing or insulation.
   4. Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.
   5. Space anchors as indicated but not more than 16 inches on-center vertically and horizontally. Install additional anchors within 1 foot of openings and at intervals around perimeter not exceeding 8 inches.

B. If masonry veneer is concrete-masonry, provide single-wythe joint reinforcing at 16 inches vertically, staggered with ties.

3.14 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
   1. Provide open space not less than 1 inch wide between masonry and structural member unless otherwise indicated. Keep open space free of mortar or other rigid materials.
   2. Anchor masonry to structural members with adjustable anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated but not more than 16 inches on center vertically and horizontally.

3.15 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as masonry progresses. Do not form continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:
   1. Install preformed control joint gaskets designed to fit standard sash block.
      a. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
      b. Unless noted otherwise in drawings, continue reinforcing in bond beams through control joints. Rake vertical joint on each side, and provide backer rod and sealant in joint.
      c. Size control joints as indicated on drawings; if not indicated,3/4 inch (19 mm) wide and 1/2" deep.

C. Form expansion joints in brick made from clay or shale as follows:
   1. Build flanges of factory-fabricated expansion joint units into masonry.
   2. Build in compressible joint fillers where indicated.

3. Form open joint of width indicated but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7. Maintain joint free and clear of mortar.

D. Build in horizontal pressure-relieving joints where indicated. Construct joints by either leaving air space or inserting nonmetallic, 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7.
   1. Locate compressible filler beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

E. Install nonmetallic expansion joint strips at building expansion joints.

3.16 LINTELS

A. Install as shown on the drawings.

B. Provide masonry lintels where shown and wherever openings of more than 1 foot for brick-sized units and 2 feet for block-sized units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installing. Temporarily support formed-in-place lintels.
   1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars filled with coarse grout.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.17 CAVITIES/AIR SPACES

A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush. No voids are allowed.

B. Install cavity drainage material. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

C. Installing Cavity-Wall Insulation:
   1. For rigid insulation, attached to masonry install small pads of adhesive spaced approximately one foot on-center both ways on inside face or attach to inside face with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
      a. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
   2. For attachment to metal framing backup anchor thru insulation and sheathing into the metal stud using masonry anchors specified. Butt joints tightly both ways. Install tongue and groove panels with tongue in the up position.
      a. Seal all joints between insulation board units in cavity with joint sealing tape, to form a tight seal at all joints, including areas around masonry anchors and other openings. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
   3. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

3.18 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in wall and where indicated.

B. Install cavity vents in head joints at top of each continuous air space in cavity and anchored veneer walls.
   1. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated. Space vents to match weep holes at bottom of cavity.
   2. Install MortarNet at every floor level. For wall cavities that exceed 11' in height, place an additional continuous trapezoidal strip on wall reinforcing anchors/ties at every 9' to 11' of wall height.

3. Flashing should extend at least 6 " above the top of MortarNet, as should any other materials used to fill space between MortarNet and inside cavity surface.
4. No more than 1/4" should be left between MortarNet and cavity's inside surface (flashing or filler)
5. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing.
    a. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape or neoprene gasket as recommended by flashing manufacturer before covering with mortar.

C. Install flashings as follows:
1. At multi-wythe masonry walls: Extend flashing from exterior face of outer wythe of masonry, through outer wythe, turned up minimum of 8 inches, and through inner wythe to within 1/2 inch of interior face of wall in exposed masonry.
    a. Where interior surface of inner wythe is concealed by furring, carry flashing completely through inner wythe and turn up approximately 2 inches unless otherwise indicated.
2. At anchored veneer walls: Install flashing in masonry veneer walls as specified above, but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper or sheathing, lapping at least 4 inches. Fasten with termination bar and sealant.
3. At lintels and shelf angles, extend flashing minimum 6 inches into masonry at each end. Provide end dams by turning upwards flashing at ends of lintels.
4. At heads and sills, extend flashing as specified above unless otherwise indicated, but turn up ends not less than 2 inches to form pan.
5. Install metal flashing termination beneath membrane flashing at exterior face of wall. Stop membrane flashing 1/2 inch back from outside face of wall, and adhere membrane flashing to top of metal flashing termination.

D. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashings and as follows:
1. Form weep holes with product specified in Part 2 of this section.
2. Space weep holes 16 inches on center.
3. In cavities/air spaces, place cavity drainage material as indicated in Architectural drawings.

F. Install termination bars, reglets, and nailers for flashing and other related construction where shown to be built into masonry.
1. Install termination bar just below top of flashing.
2. Install sealant at top of flashing and termination bar.

3.19 PARGING

A. Parge pre-dampened masonry walls where indicated with Type S or Type N mortar applied in two uniform coats to total thickness of 1/2 inch. Scarify first parging coat to ensure full bond to subsequent coat.
1. Damp-cure parging at least 24 hours. Protect until cured.

3.20 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, windows, curtain walls, storefronts and anchor bolts and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

3.21 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.22 FIELD QUALITY CONTROL

A. Refer to Section 01 44534 Code Required Special Inspections for additional requirement.

B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.

C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

D. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

E. Inspecting installation of anchors, joint reinforcing, cavity insulation, cavity mortar net, weep holes etc.
   1. Weep holes shall be tested by placing water (by bucket or hose) into cavity.

3.23 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During joint tooling, enlarge voids or holes except weep holes and completely fill with mortar Point-up joints including corners, openings, and adjacent construction to provide 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 set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel. Leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with masonry cleaning.
   3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
   4. Wet wall surfaces with water prior to applying cleaners. Remove cleaners promptly by rinsing thoroughly with clear water.
   5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised."
   6. Clean concrete masonry by means of cleaning method indicated in NCMA "TEK 8-4A" applicable to type of stain on exposed surfaces.
   7. Clean limestone units to comply with recommendations in ILI Handbook of Indiana Limestone Institute of America, Inc.

E. Protection: Provide final protection and maintain conditions in manner acceptable to installer that ensures unit masonry is without damage and deterioration at time of substantial completion.

3.24 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of referenced unit masonry standard.

B. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).

C. Maximum Variation from Unit to Adjacent Unit: as per ASTM.

D. Maximum Variation from Unit to Adjacent Unit: 1/16 inch (1.6 mm).

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

G. Maximum Variation from Cross Sectional Thickness of Wall: 1/4 inch (6 mm).

3.25 FIRE RATED WALL MARKING AND IDENTIFICATION

A. For all masonry walls or partitions indicated to be fire rated, or smoke rated, where there is an accessible concealed floor, ceiling or attic space adjacent to said wall. Contractor shall permanently mark with signs or stenciling within he concealed space, in accordance with IBC 703.7 in concealed spaces.

1. Identifications shall be located within 15 feet of the end of each wall or partition and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
2. Identifications shall include lettering not less than 3 inches in height with a minimum 3/8 inch stroke width in a contrasting color incorporating the wording " FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS"

3.26 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

END OF SECTION

CAST STONE MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are:

1. Exterior units, including wall caps, coping, sills, surrounds, cornice bands, and keystones.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Mortar for setting cast stone and installation of cast stone in conjunction with masonry.

B. Section 07 6200 - Sheet metal flashings and trim

C. Section 07 9200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.4 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2017).

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2016.

D. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2017.

E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

H. ASTM C 426 – Standard Test Method for Linear Shrinkage of Concrete Masonry Units.

I. ASTM C 260 – Standard Specification for Air Entrained Admixtures for Concrete.

J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2017.

K. ASTM C 618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Concrete

L. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2013.

M. ASTM C 666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

N. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

O. ASTM C 1194 – Standard Test Method for Compressive Strength of Architectural Cast Stone

P. ASTM C 1195 – Standard Test Method for Absorption of Architectural Cast Stone.

Q. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2017.

R. Cast Stone Institute® Technical Manual Cast Stone Institute® Technical Manual.

1.5 DEFINITIONS

A. Cast Stone – A refined architectural concrete building unit manufactured to simulate natural cut stone, used in unit masonry applications.

1. Dry Cast Concrete Products – manufactured from zero slump concrete.

a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
b. Machine casting method: manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it becomes densely consolidated.

2. Wet Cast Concrete Products - manufactured from measurable slump concrete.
   a. Wet casting method: manufactured from measurable slump concrete and vibrated into a mold until it becomes densely consolidated.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Test results of cast stone components made previously by the manufacturer.

C. Shop Drawings: Include plans, elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

D. Mortar Color Selection Samples.

E. Verification Samples: Pieces of actual cast stone components not less than 12 inches (305 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.

F. Source Quality Control Test Reports.

G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm with a minimum of 5 years of experience in producing cast stone of the types required for project and:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
   2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.

B. Standards: Comply with the requirements of the Cast Stone Institute® Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.

C. Testing Agency Qualifications: An independent testing agency will be retained by the Owner, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
   1. Job Site Testing - One (1) sample from production units may be selected at random from the field for each 500 cubic feet delivered to the job site. Perform tests in accordance ASTM C 1194 and C 1195.
   2. Three (3) field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
   3. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
   4. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195

D. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer

E. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.
   1. Approved mock-up will become standard for appearance and workmanship.
   2. Mock-up may remain as part of the completed work.
   3. Remove mock-up not incorporated into the work and dispose of debris.

1.8 MOCK-UP

A. For repointing - provide 4 foot square mockups to show how the joints will be cut, and 2 foot square mockups to show new pointing

1. Joint repointing shall be performed within 10 days prior to start of work in order to permit maximum drying time for mortar.

B. Anchors.

C. How flashings will be built into the masonry.

D. Other related materials and their installation techniques to fully establish a quality standard for the work

E. The purpose of each mock up is to establish the minimum acceptable standard of materials and workmanship and to assure that completed installations based on the mock ups will be fully functional and serve the purpose for which they have been designed

F. Clean a 10 ft (3 m) by 10 ft (3 m) panel of wall to determine extent of cleaning.
1. Repeat, using different cleaning methods for up to three different panels.

G. Locate where directed.

H. Acceptable panel and procedures employed will become the standard for work of this section.

I. Allow samples to cure at least three days (or longer, if possible) before obtaining Owner's approval for color match. Mortar colors will continue to lighten as they cure and are exposed to the weather, so samples should be installed as far in advance as possible. Samples should be viewed from a minimum distance of 12 feet.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Package units and protect them from staining or damage during shipping and storage.

B. Provide an itemized list of product to support the bill of lading.

C. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

D. Number each piece individually to match shop drawings and schedule.

E. Store cast stone components and installation materials in accordance with manufacturer's instructions.

F. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

G. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

H. Store mortar materials where contamination can be avoided.

I. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports

J. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
1. 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
a. Sun Precast Co., Inc., 4051 Ridge Rd, Beaver Springs, PA 17812. (570) 658-8000 .
b. Continental Cast Stone East, 400 Cooper Road, W. Berlin, NJ 08091. 856-753-4000.

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
1. Compressive Strength: 6,500-psi minimum at 28 days
2. Maximum Water-Cement Ratio at Point of Placement: 0.40

3. Absorption - ASTM C 1195: 6% maximum by the cold water method, or 10% maximum by the boiling method for products at 28 days
4. Air Content - ASTM C173 or C 231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products
5. Thaw Resistance: Demonstrated by field experience. The CPWL shall be less than 5% after 300 cycles of freezing and thawing.
6. Linear Shrinkage - ASTM C 426: Shrinkage shall not exceed 0.065%.
7. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
8. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in. (0.8 mm) and the density of such voids shall be less than 3 occurrences per any 1 in. 2 (25 mm2) and not obvious under direct daylight illumination at a 5 ft (1.5m) distance.
9. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft (3m) distance.
10. Color: Match existing.
11. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
   1. Pieces More than 24 inches (610 mm) in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.
   2. Pieces More than 12 inches (305 mm) Wide: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.3 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Units: Type I, white or gray as required to match Fuller and D'Angelo P.C. 's sample.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.

E. Admixtures: ASTM C 494/C 494M for water reducing, retarding, accelerating and high range admixtures.

F. Air-Entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other admixtures used.
   1. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 5 to 7 percent

G. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

H. Water: Potable.

I. Reinforcing Bars: ASTM A615/A615M deformed bars, epoxy coated.

J. Steel Welded Wire Reinforcement: ASTM A884/A884M, epoxy coated.

K. Suggested Cast Stone Anchors:
1. All anchors shall be sized and detailed for the appropriate specific conditions.
2. Type 304 Stainless Steel, eye rod anchor with 7-1/2" x 1/4" diameter shank,
   a. 167-A, with 1-1/2" bend, stone anchor ,by Hohmann & Barnard
3. Spring Loaded Dowel: 3/8" x 3", stainless steel rod with 3'-2", stainless steel spring.
   a. #355 Heckmann Building Products.
4. Type 304 Stainless Steel Dowel: 3/8" x 3".
   a. #155 Heckmann Building Products.
5. Stone and Masonry Anchor: Type 304 Stainless Steel, 1" x 16 ga. x length required.
   a. #274 and #275V by Hohmann & Barnard.
6. Anchor Pin: Type 304 Stainless Steel, 8" x 1/2"diameter.
   a. #407 by Hohmann & Barnard.
7. Back-up Wall Anchor: Type 304 stainless steel.
   a. "Pos-I-Tie" with triangle wire tie by Heckman Building Industries.

L. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

M. Shelf Angles and Similar Structural Items: Type 304 stainless steel, of shapes and sizes as required for conditions.

N. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; Use products approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

O. Refer to Section 07 6200 - Sheet Metal Flashing and Trim for metal flashings.

P. Section 04 2000 - Unit Masonry for rubber flashings, mortar, accessories, and grout.

2.4 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption of specimens selected at random from plant production.
1. Test in accordance with ASTM C642.
2. Select specimens at rate of 3 per 500 cubic feet (3 per 14 cubic m), with a minimum of 3 per production week.
3. Submit reports of tests by independent testing agency, showing compliance with requirements.

2.5 FABRICATION

A. Provide cast stone units complying with ASTM C 1364.

B. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.

C. Reinforce units as indicated and as required by ASTM C 1364. Use epoxy-coated reinforcement when covered with less than 1-1/2 inches of material or when specified.
1. Reinforce units as required for safe handling and structural stress.

D. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
1. Slope exposed horizontal surfaces at least 1:12, unless otherwise indicated.
2. Provide drips on projecting elements.

E. Fabricate all corner coping stones in 90 degree section

F. Cure and finish units as follows:

1. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
2. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.
3. Acid etch units to remove cement film from surfaces indicated to be finished.
4. Colors and Textures: As selected from manufacturer's full range of colors and textures..

2.6 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 04 2000 - Unit Masonry.

2.7 ACCESSORIES

A. High Impact resilient setting shims.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine construction to receive cast stone components. Notify Fuller and D'Angelo P.C. if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 2000 - Unit Masonry.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
1. Drench cast stone components with clear, running water immediately before installation.
2. Set units in a full bed of mortar unless otherwise indicated.
3. Fill vertical joints with mortar.
4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
5. Set dowels with epoxy grout.
6. Build concealed flashing into mortar joints as units are set.

D. Joints:
1. At stone to brick joints 3/8 inch (9.5 mm), except as otherwise detailed.
2. At stone to stone joints in vertical position 1/4".
3. At stone to stone joints exposed at top 3/8".
4. Rake mortar joints 3/4 inch (19 mm) for pointing.
5. Remove excess mortar from face of stone before pointing joints.
6. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
7. Leave the following joints open for sealant:
   a. Head joints in top courses, including copings, parapets, cornices, sills.
   b. Joints in projecting units.
   c. Joints between rigidly anchored units, including soffits. and panels.
   d. Joints below lugged sills.
   e. Joints below ledge and relieving angles.
   f. Joints labeled "expansion joint".
8. Joint Locations
   a. As shown on drawings.
   b. At control and expansions at joints, unless noted otherwise.

E. Setting Anchored Cast Stone with Sealant-Filled Joints.

1. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
   a. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
   b. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
2. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.
3. Fill anchor holes with sealant.
   a. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
4. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
5. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
   a. Form open joint of width indicated, but not less than 3/8 inch (10 mm).
6. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 9200 - Joint Sealants.
   a. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.3 TOLERANCES

A. Manufacturing Tolerances:
   1. Cross section dimensions shall not deviate by more than ±1/8 in. (3mm) from approved dimensions.
   2. Length of units shall not deviate by more than length/ 360 or ±1/8 in. (3 mm), whichever is greater, not to exceed ±1/4 in. (6 mm).
      a. 1. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
   3. Warp, bow or twist of units shall not exceed length/ 360 or ±1/8 in. (3 mm), whichever is greater.
      a. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features - On formed sides of unit, 1/8 in. (3 mm), on unformed sides of unit, 3/8 in.

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

C. Color and Finish:
   1. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32" and the density of such voids shall be less than 3 occurences per any 1 square inch and not obvious under direct daylight illumination at a 5'-0" distance.
   2. Unit shall exhibit a texture approximately equal to the approved sample when viewed under direct sunlight illumination at a 10'-0" distance.

3. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
   a. Total color difference - not greater than 6 units.
   b. Total hue difference - not greater than 2 units
4. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft (6 m) distance.

D. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Fuller and D'Angelo P.C. 's approval.

3.4 FIELD QUALITY CONTROL

A. Inspect finish installation in accordance to Cast Stone Institution Technical Bulletin 36.

B. Inspectors: Owner will engage qualified inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

C. Notify Construction Manager in advance of times when lift devices and/or scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.5 CLEANING

A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.

B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

C. Clean surrounding surfaces.

D. Carefully sweep the roof to remove all residual debris upon the completion of all work. After cleaning the roof, thoroughly clean all drain sumps and drain lines, leader heads and leaders. Do not allow debris to enter the drain lines, leaders or underground drain lines

E. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Fuller and D'Angelo P.C. 's approval.

F. Clean completed exposed cast stone after mortar is thoroughly set and cured.
   1. Wet surfaces with water before applying cleaner.
   2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
   3. Remove cleaner promptly by rinsing thoroughly with clear water.
   4. Do not use acidic cleaners.
   5.

3.6 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

C. Protect from splashing by mortar and other damage.

END OF SECTION

STRUCTURAL STEEL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Section 05 2100: Steel Joist Framing.

C. Section 05 3000: Metal Deck, including field-installed shear connectors.

1.2 DESCRIPTION OF WORK

A. This section includes structural steel.

1.3 QUALITY ASSURANCE

A. Comply with latest editions of:

1. American Institute of Steel Construction (AISC), "Manual of Steel Construction," including:
    a. ANSI/AISC 360, "Specification for Structural Steel Buildings."
    b. AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
    c. Research Council on Structural Connections (RCSC), "Specification for Structural Joints Using High-Strength Bolts."
2. American Welding Society, Inc. (AWS)
    a. AWS D1.1 "Structural Welding Code - Steel."
    b. AWS C5.4 "Recommended Practices for Stud Welding."
3. Research Council on Structural Connections (RCSC), Educational Bulletin No. 4, "Recommended Erection and Field Inspection Procedures for High-Strength Bolts in Structural Steel Assemblies."
4. American Hot-Dip Galvanizers Association, Inc.; Zinc Institute Inc.
    a. "Inspection Manual for Hot-Dip Galvanized Products."
5. Steel Structures Painting Council (SSPC)
    a. "Surface Preparation Specifications."

B. Qualifications for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS standards.
2. Provide one of the following certifications for welders to be employed in work.
    a. Certification of satisfactorily passing AWS qualification tests within previous 12 months to perform type of welding in work.
    b. Work record signed by supervisor showing regular employment within previous 12 months to perform type of welding in work.

C. Qualifications for Fabricator, Detailer, and Erector:

1. Fabricator, Detailer, and Erector of structural steel shall have minimum 3 years experience in fabricating, detailing, and erecting structural steel.
    a. Erector Qualifications: Erector shall be AISC Certified Erector, Category CSE.
    b. Fabricator Qualifications: Fabricator shall be AISC Certified Fabricator, Category STD.
    c. AISC Certification for Fabricators and Erectors may be waived at the discretion of Owner, Architect, and Engineer provided acceptable written quality assurance and quality control plan is submitted.
2. Submit written description of ability.

3. At completion of fabrication, Fabricator shall submit Certificate of Compliance to Special Inspector and Code Enforcement Official stating work was performed in accordance with approved Construction Documents in accordance with Chapter 17 of the *International Building Code* (IBC) as referenced by the *New York State Uniform Code.*

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Contractor shall employ testing laboratory acceptable to Engineer and Architect to perform material evaluation tests.

B. Submit testing service qualifications demonstrating experience with similar types of projects.

C. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion for a given section of work so they may determine if site observations are required. If site observations are required, do not conceal framing until RDPs have had opportunity to make observations.

1.6 SUBMITTALS

A. General: Review of submittals will be for general conformance only. Compliance with requirements for materials, fabrication, erection, and dimensioning of structural steel shall be Contractor's responsibility. Resubmitted shop drawings shall have revisions identified and dated.

B. Connections: Submit as follows:

1. Submit proposed connection types and calculations for review before preparing detailed shop drawings.

2. Submit connection calculations in accordance with Option 3 of AISC *Code of Standard Practice for Steel Buildings and Bridges*. Calculations shall be stamped by a licensed Professional Engineer in New York State (Connection Design Engineer) retained by Fabricator.

3. Connections shown on shop drawings shall be coordinated with the submitted connection calculations. Submit written confirmation from Fabricator’s Connection Design Engineer that the shop and erection drawings accurately incorporate the connection designs.

D. Shop Drawings: Submit detailed drawings showing:

1. Submit Shop Drawings showing details of each individual steel shipping piece.

2. Submit Erection Drawings showing location and attachment of individual steel shipping pieces. Including field installation details in Erection Drawings.

3. Reference Contract Drawing number and addendum number in each shop and Erection drawing.

4. Shop and Erection drawings shall show:

a. Details including cuts, copes, camber, connections, holes, bolts, and other pertinent information.

b. Connection design loads.

c. Material, including ASTM designations and grades or manufacturer’s data as appropriate.

d. Welds with size, length, and type.

e. Anchor rod locations.

f. Location of shop-welded masonry anchors and weldable reinforcement. Coordinate with Division 4 and Masonry Contractor.

5. Shop and Erection drawings shall be checked by detailer and noted as checked in drawings before submitting. Failure to submit checked Shop and Erection drawings will be cause for their return without review. If drawings are not prepared by detailer under direct control of Fabricator, Fabricator shall stamp each drawing and initial or sign stamp to certify review and approval of drawings and conformance with Fabricator's shop practice and capability.

D. Material Data: Submit to Special Inspector and Engineer laboratory test reports and other data as required to show compliance with specifications. Submit producer's or manufacturer's specifications and installation instructions for the following products:

1. Structural steel, including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts, including nuts and washers.
3. Unfinished bolts and nuts.
4. Structural steel primer paint if used.
5. Welding electrodes.
6. Post-installed anchors (expansion, sleeve, or chemical adhesive) if used.

E. Bolt Certification: Submit to Special Inspector and Engineer certifications that bolts, nuts, and washers furnished comply with specifications. Submit manufacturer's inspection certificates for mill tests. For fasteners to be accepted, lot numbers on kegs, boxes, or bags must correlate with lot numbers shown in accepted test certificates and identification numbers in mill test reports. Manufacturer's symbol and grade markings must appear on bolts and nuts.

F. Field Modifications: Submit drawings showing field modifications required to conform to actual field conditions or as required to correct errors in shop drawings, fabrication, or erection.

G. Erector's Welding Procedure Specifications: Submit welding procedure specifications for joint types detailed for field welding.

1.7 PRODUCT HANDLING

A. Store material in horizontal position on supports above ground.

B. Protect from weather, and keep free of dirt and debris.

C. Handle material carefully so it is not bent or marred.

D. Store bolted fastener components in closed containers protected from moisture and contamination. Remove from protective storage containers only number of fasteners required for one shift. Return fasteners not installed at end of work day to protective storage.

E. Repair or replace damaged materials. Do not incorporate in work fastener components that accumulate rust or dirt.

1.8 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Engineer.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials shall be new and free from rust.

B. Rolled-Steel Plates and Bars: ASTM A 36 or ASTM A 572, Grade 50. Provide ASTM A 572, Grade 50 where indicated in the drawings.

C. Rolled-Steel Angles, C and MC Shapes: ASTM A 36 or ASTM A 572, Grade 50. Provide ASTM A 572, Grade 50 where indicated in the drawings.

D. Rolled-Steel W and WT Shapes: ASTM A 992.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

F. Unfinished Bolts, Nuts, and Washers: ASTM A 307, Grade A.

G. High-Strength Bolts: ASTM A 325 or A 490, Type 1, plain.

H. Twist-Off-Type, Tension-Control Bolt Assemblies: ASTM F1852 or ASTM F2280.

I. High-Strength Bolts, Galvanized: ASTM A 325, Type 1.

J. Anchor Rods: ASTM F 1554, Grade 36 or Grade 55 with Supplement S1, unless otherwise indicated in Drawings.

K. Threaded Rods: ASTM A 36 unless otherwise indicated in Drawings.

L. Nuts: ASTM A 563. Grade and finish to match bolt or rod type.

M. Washers: ASTM F 436 (ASTM F 844 for ASTM A 307 bolts, A 36 rods and F 1554 Grade 36 anchor rods). Finish to match bolt or rod type.

N. Direct Tension Indicator Washers: ASTM F959 for use in pretensioned and slip-critical joints where direct-tension-indicator method is used. DTI "Squirter" as manufactured by Applied Bolting Technology or accepted equivalent.

O. Electrodes: E70 and in accordance with AWS.

P. Headed Stud Anchors: ASTM A 108, AWS Type B, minimum tensile strength 65 ksi, solid-fluxed and in accordance with AWS. Use arc shield (ferrule) with each anchor. Size as indicated in drawings.

Q. Steel Primer Paint: For steel scheduled to receive finish paint, use primer compatible with finish paint specified in Division 9.

R. Hot-Dip Galvanizing: Hot-dip galvanize after fabricating in accordance with ASTM A 123. Restraighten members after galvanizing, if necessary, to be square and true. Items to be hot-dip galvanized are identified in drawings.

S. Cold-Galvanizing Compound: Zinc-rich, anti-corrosion paint complying with ASTM A780. “ZRC Cold Galvanizing Compound” by ZRC Worldwide; “Roval Cold Galvanizing Compound” by Roval Corporation; or accepted equivalent. Items to be cold galvanized are identified on the drawings.

Y. Galvanizing Touch-up Compound: Zinc-rich, anti-corrosion paint complying with ASTM A780. “ZRC Galvilite” by ZRC Worldwide; “Roval ZC Galvanizing Repair” by Roval Corporation; or accepted equivalent. Use for field touch-up of hot-dip galvanized surfaces.

U. Below-Grade Coating: Coal-Tar Epoxy, “TNEMEC 46H-413” or accepted equivalent.

V. Expansion Anchors: “Kwik-Bolt 3” or “Kwik-Bolt-TZ” by Hilti; “Trubolt Wedge Anchors” by ITW Ramset/Red Head; “Power-Stud” by Powers Fasteners; “Wedge-All” by Simpson/Strong-Tie; or accepted equivalent.

W. Screw Anchors: “Kwik HUS-EZ Screw Anchor” by Hilti; “Large Diameter Tapcon (LDT) Anchor” by ITW Ramset/Red Head; “Wedge-Bolt +” by Powers Fasteners; “Titen HD” by Simpson/Strong-Tie; or accepted equivalent.

X. Chemical Adhesive Anchors:

1. Anchors to solid concrete:

   a. Anchors for use when base material temperature is 0°F or greater: “HIT-Ice” by Hilti; “Epcon A7” by ITW Ramset/Red Head; “AC 100 Plus” by Powers Fasteners; “AT Acrylic-Tie” by Simpson/Strong-Tie; or accepted equivalent.

   b. Anchors for use when base material temperature is 40°F or greater; “HIT-HY 200 Safe Set System with HIT-Z Rod or Hollow Drill Bit System” or “HIT-RE 500-SD” by Hilti; “Epcon C6” by ITW Ramset/Red Head; “T308 Plus” by Powers Fasteners; “ET Epoxy-Tie” by Simpson/Strong-Tie; or accepted equivalent.

2. Anchors to hollow masonry (brick or hollow CMU), grouted CMU, solid brick, or stone:

   a. Anchors for use when base material temperature is 0°F or greater: “Epcon A7” by ITW

Ramset/Red Head; "AC 100 Plus" by Powers Fasteners; "AT Acrylic-Tie" by Simpson/Strong-Tie; or accepted equivalent.

b. Anchors for use when base material temperature is 40°F or greater: "HIT-HY 70" by Hilti; "Epcon C6" by ITW Ramset/Red Head; "T308 Plus" by Powers Fasteners; "ET Epoxy-Tie" by Simpson/Strong-Tie; or accepted equivalent.

c. Provide manufacturer's standard screen tubes for use with anchors.

Y. Weld-On Masonry Anchors: No. 317 continuous weld-on anchor rod by Heckmann Building Products for columns; No. 315 anchor rod for beams.

Z. Furnish loose masonry anchors that are to be field-attached to structural steel by others. Provide No. 316 Triangular Ties and No. 318 Web Ties, size to suit wall, by Heckmann Building Products.

AA. Thermal Isolation Material (TIM): High-performance, fire-retardant, fiberglass-reinforced laminate composite for use between flanged connections of internal and external steelwork to limit thermal bridging, as manufactured by Fabreeka, Inc.; "Series 625 Extren" by Strongwell; or Type TBG300 by Farrat, Inc.; or accepted equivalent.

2.2 FABRICATION

A. Fabricate structural steel in strict accordance with reviewed shop drawings and referenced standards.

B. Fabricate and assemble structural material in shop to greatest extent possible.

C. Fit stiffeners neatly between girder flanges. Where tight fits are required to transmit bearing, mill or grind ends of stiffeners for even bearing against flange.

D. Provide camber as indicated in drawings. Where no camber is indicated, fabricate steel with mill camber up. Camber by mechanical means or by use of V-heat up to 1,200 degrees F maximum.

E. Remove extension bars or runoff plates upon completing and cooling groove welds. Grind ends of welds smooth and flush with edges of abutting parts.

F. Provide holes for securing other work to structural steel framing. Comply with AISC Specification 360, Section M2 for surface roughness for holes.

G. For members to be hot-dip galvanized, comply with the American Galvanizer's Association Design Guide: The Design of Products to be Hot-Dip Galvanized After Fabrication.

H. Unless shown otherwise in drawings, Fabricator shall detail column splice using AISC standard details. Finish ends of column shafts for direct bearing.

I. Finish bottom of column and weld to base plate. Use flat base plates.

J. Anchor Rods: Furnish anchor rods, leveling plate, or other devices necessary for setting anchoring rods required for securing structural steel to foundation, concrete, or masonry.

K. Weld headed stud anchors with automatically timed, stud-welding equipment in accordance with AWS Specifications. Remove arc shields from studs after welding.

L. Where headed stud anchors are to be welded to galvanized steel, Fabricator has the following options:

1. Remove galvanized coating from surfaces to receive headed stud anchors prior to welding. Touch-up with cold-galvanizing paint after welding.

2. Weld headed stud anchors to beams prior to galvanizing.

2.3 SHOP PAINTING

A. Shop-paint structural steel work that will remain exposed to view in final work or where indicated in drawings. Do not paint members or portions of members to be concealed in final work embedded in concrete or mortar or to receive spray-on fireproofing unless noted otherwise in drawings.

B. Do not paint the following surfaces:

1. Surfaces within 2 inches of field welds.

2. Surfaces within 1½ inches from center of high-strength, slip-critical (SC) bolts or areas within bolt

pattern.

3. Top flanges of beams to receive field-installed shear connectors or weldable reinforcement. Coordinate locations with installers.

4. Top and bottom flanges of beams to receive field-installed brace angles, shear wall connectors, or hybrid connectors. Coordinate locations with installers.

C. Apply two coats of paint to surfaces that will be inaccessible after assembly or erection. Apply two coats to surfaces indicated to be cold-galvanized.

D. For steel to be spray-fireproofed, clean steel to remove dirt, grease, rust, and loose mill scale in accordance with SSPC-SP3 "Power Tool Cleaning."

E. For steel to be cold-galvanized or primed and finish-painted, clean steel to remove dirt, grease, rust, and loose mill scale in accordance with SSPC-SP6 "Commercial Blast Cleaning" unless recommended otherwise by paint manufacturer.

F. For steel to be hot-dip galvanized, prepare steel by successive immersion in chemical baths of caustic cleaning, pickling, and flux.

G. After surface preparation, immediately apply structural steel primer paint in accordance with manufacturer's instructions at rate to provide uniform dry-film thickness of 2 mils. Use painting methods that will result in full coverage of joints, corners, edges, and exposed surfaces.

H. Apply coal-tar epoxy coating to steel below slab on grade and in contact with soil or subbase materials or as indicated in drawings. Extend coating 1 inch into slab.

2.4 CONNECTIONS

A. Comply with requirements of this section unless indicated otherwise in drawings.

B. A licensed Professional Engineer (Connection Design Engineer) shall be retained by Fabricator to design connections in accordance with Option 3 in AISC *Code of Standard Practice for Steel Building and Bridges.*

C. Use connection dimensions and sizes complying with AISC-published recommendations and limitations shown in drawings.

D. For shear connections, use only connections published in the AISC *Steel Construction Manual* without modification unless otherwise indicated in Drawings.

E. Connections shown in the Drawings are representative details. Design connections to comply with the requirements and limitations as shown in the Drawings.

F. Weld or bolt shop connections.

G. Bolt field connections wherever possible.

H. Minimum Capacity of Beam Connections: For connections not detailed, provide connection capacity for shear, axial, and moment reactions shown in drawings. If reactions are not shown in drawings, base on either Allowable Stress Design or Load and Resistance Factor Design as follows:

1. Shear Connections:

   a. At least 50 percent of uniform load from Maximum–Uniform Load Tables in AISC *Steel Construction Manual*, Part 3, for given steel member (ASD or LRFD, as appropriate).

   b. At least 70 percent of uniform load from Maximum Uniform Load Tables in AISC Steel Construction Manual, Part 3, for beams and girders with shear connectors (ASD or LRFD, as appropriate).

   c. Concentrated loads near supports must be added.

2. Moment Connections:

   a. Design moment connections for full bending capacity for given steel member.

I. Beam connections to columns shall be in accordance with AISC and comply with the following.

1. Use AISC Double-Angle Shear Connection for beam connections welded to faces of HSS columns having a workable flat of 6.75 inches or greater and to faces of W column flanges that have a width of 6.75 inches or greater.
2. Use AISC Double-Angle Shear Connection for beam connections bolted to faces of W column flanges that have a width greater than 6 inches.
3. Use AISC Single-Plate Shear Connection for beam connections to faces of columns smaller than required for double-angle shear connection.
4. AISC Seated Connections are permitted as an alternative to double-angle and single-plate shear connections.

J. Use AISC Single-Plate, Single-Angle, Double-Angle, or End-Plate Shear Connection for beam-to-beam connections.

K. Provide high-strength or unfinished threaded fasteners installed snug-tight for bolted bearing connections of secondary framing members to primary members including girts, door framing systems, and roof openings.

L. Provide high-strength fasteners for principal bolted connections unless otherwise indicated.

M. Fabricator shall provide connections to properly transmit total reactions, moments, and axial forces either indicated in drawings or reasonably inferred from information provided.

N. Provide snug-tightened joints using bearing bolts with thread condition N for bolted connections unless indicated otherwise. Provide pretensioned or slip-critical joints where shown or noted in drawings. For slip-critical joints, provide AISC Class A faying surface condition.

O. Remove burrs that prevent solid seating of connected parts.

P. ASTM F1852 or F2280, twist-off-type, tension-control bolt assemblies may be used at snug-tightened. Compliance with RCSC Specifications for pre-installation testing and installation inspection is mandatory for the use of twist-off type, tension-controlled bolted connections, including pretensioned or slip-critical joints.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine conditions under which work shall be erected. Do not proceed until unsatisfactory conditions are corrected.

3.2 ERECTION

A. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of a complete frame or structure before permanently fastening.

B. Fit up connections to be field welded in compliance with AWS standard tolerances for review by the Special Inspector or Testing Agency prior to field welding.

C. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly.

D. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified tolerances.

E. Contractor may field modify anchor rods and embedded structural supports incorrectly located or damaged after installation as indicated in Section 03 3000 and tested by Testing Agency. Submit documentation showing proposed field modification for review and acceptance by Engineer before beginning.

F. Splice members only where shown or specified.

G. Maintain work in stable condition during erection.

H. Erect masonry shelf angles connected to structural steel to approximate elevations shown in drawings. Weld after final adjustment is made by Masonry Contractor and before application of load. Coordinate

with Division 4.

I. Where weldable reinforcing bars are to be welded to structural steel members, coordinate installation of weldable reinforcement with Masonry Contractor.

J. Install snug-tightened, pretensioned, and slip-critical bolted joints to comply with RCSC “Specification for Structural Joints Using High-Strength Bolts” and to comply with RCSC Educational Bulletin No. 4, “Recommended Erection and Field Inspection Procedures for High-Strength Bolts in Structural Steel Assemblies.” Compliance with RCSC Specifications and Bulletins is mandatory for installation of all high-strength bolted connections including pretensioned or slip-critical joints.

K. Install field connections and framing as detailed in Contract Documents and accepted shop drawings. If Contractor finds field modifications are necessary, submit documentation of proposed field modifications to Architect and Engineer for review and acceptance before beginning.

1. Use of thermal cutting for field modifications is prohibited unless documented and accepted by Engineer before beginning.

2. Use of thermal cutting for enlarging or cutting bolt holes in field is prohibited.

3.3 TOLERANCES

A. Tolerances shall be within limits in AISC "Code of Standard Practice.”

B. Fabrication and mill tolerance shall be within limits in AISC “Standard Mill Practice.”

3.4 TOUCH-UP PAINTING

A. After erection is complete, touch up paint-damaged shop coats and welded areas with shop primer paint applied in accordance with manufacturer's instructions.

B. Touch up paint damaged galvanized surfaces and welded areas with galvanizing touch-up compound or cold-galvanizing compound applied in accordance with manufacturer's instructions.

C. Prepare surfaces of hot-dip galvanized members where the galvanization was omitted, or damaged in accordance with SSPC-SP3 "Power Tool Cleaning.” Prepare field-welded galvanized members similarly.

D. Remove weld slag before applying touch-up paint.

3.5 TEMPORARY SHORING AND BRACING

A. Provide temporary shoring and bracing members as required with connections of sufficient strength to bear imposed loads.

B. Remove temporary members and connections when permanent members are in place and final connections are made.

C. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

3.6 PROTECTION

A. Do not use members for storage or work platforms until permanently secured.

B. Do not exceed load capacity of members with construction loads.

3.7 WELDING TO EXISTING STEEL

A. Clean area to be welded using mechanical grinders and solvents to remove paint, rust, and other materials.

B. Use E7018, low-hydrogen electrodes stored in ovens as prescribed by AWS. Preheat steel to be welded and maintain temperatures as prescribed by AWS.

END OF SECTION 05 1200

STEEL JOIST FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to work of this section.

B. Section 05 1200: Structural Steel.

C. Section 05 3000: Metal Deck.

1.2 DESCRIPTION OF WORK

A. Extent of steel joists and joist girders is shown in drawings, including basic layout and type of joists required.

B. Special Joists where indicated in drawings consist of steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's Standard Specifications.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with latest editions of:

1. American Institute of Steel Construction (AISC) "Specification for Structural Steel Buildings." ("Allowable Stress Design" or "Load and Resistance Factor Design".)
2. Steel Joist Institute (SJI) "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."
3. Steel Structures Painting Council (SSPC) "Steel Joist Shop Primer Paint."

B. Qualifications of Manufacturer: Qualify detailing and fabrication in accordance with SJI Standards:

1. Detailer and Fabricator shall have not less than 3-years of experience in detailing and fabrication of steel joists and joist girders.
2. Design special joists to comply with performance requirements. Provide calculations stamped by a New York State Professional Engineer.
3. Submit written description of ability.
4. At completion of fabrication, Manufacturer shall submit a Certificate of Compliance to the Special Inspector and to the Code Enforcement Official stating that the work was performed in accordance with the approved Construction Documents.

C. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with SJI Standards.

D. Qualifications for Erector of Steel Joists: Erector shall have not less than 3-years of experience in erection of steel joists and joist girders.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to Engineer and Architect to perform material evaluation tests.

B. Submit testing service qualifications demonstrating experience with similar projects.

C. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit the construction site at appropriate intervals to determine if work is in general conformance with the Contract Documents and specifications. Notify the RDPs 48 hours before the anticipated time of completion for a given section of work so that they may determine if site observations are required. If site observations are required, do not conceal the framing until the RDPs have had an opportunity to make observations.

1.6 SUBMITTALS

A. General: Review of submittals will be for general conformance only. Compliance with requirements for materials, fabrication, erection, and dimensions shall be Contractor's responsibility.

B. Shop Drawings:

1. Reference Contract Drawing number including addendum number in each shop drawing.
2. Include layout of members, connections, jointing, accessories, type, location, spacing, bridging, paint, installation instructions, and special details.
3. Provide templates or location drawings for installation of anchor bolts and metal bearing plates.

C. Manufacturer's Data: Submit to Special Inspector and Engineer laboratory test reports and other data as required to show compliance with specifications. Submit producer's or manufacturer's specifications and installation instructions.

D. Comprehensive engineering analysis of special joists (-SP) showing superimposed loading, web configuration, calculated member stresses, and allowable member stresses. Provide calculations signed and sealed by a New York State Professional Engineer.

1.7 PERFORMANCE REQUIREMENTS

A. Deflection: Allowable deflections 1/240 of clear span for total load; 1/360 of clear span for live load.

B. Uplift: Anchor joists to resist uplift loading of 30 pounds per square foot. Design joists for net wind uplift as noted in drawings or minimum of 5 psf if not noted. Provide additional bottom chord bridging as required by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists in accordance with SJI's recommendations.

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

C. Store members in vertical position above ground. Support from bearing points only. Do not support on bottom chord.

D. Protect from elements, and keep free from dirt and other debris.

E. Repair or replace damaged materials.

F. Store packaged materials in their original unbroken container.

G. Do not store materials on structure in manner that could cause distortion or damage to supporting structure.

1.9 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 STEEL JOISTS

A. General: Materials shall be new and free from rust.

B. K-Series Joists: Provide joists with steel angle top and bottom chords members.

1. Size: As indicated in Drawings.
2. Camber: In accordance with SJI unless noted otherwise.
3. Steel Joist Substitutes: Manufacture in accordance SJI with steel angle or channel members.
4. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated.

C. Long-Span Joists: Provide joists with steel angle top and bottom chords members.

1. Type: LH and DLH.

2. Size: As indicated in Drawings.
3. Camber: In accordance with SJI unless noted otherwise.
4. Profile: As indicated Drawings.

D. Header Units: Provide header units to support joists at openings not framed with structural shapes.

2.2 JOIST ACCESSORIES

A. Steel Shapes, Plates, and Bars: ASTM A 36.

B. Unfinished Bolts, Nuts, and Washers: ASTM A 307, Grade A.

C. High-Strength Threaded Fasteners: ASTM A 325 or A 490, heavy hexagon structural bolts with nuts and hardened washers.

D. Electrodes: In accordance with AWS.

E. Bridging:

1. Provide number of rows of diagonal and horizontal bridging for joists and joist girders as required for type of joist, chord size, spacing, and span required by SJI and manufacturer unless otherwise shown in drawings. Furnish additional erection bridging if required for stability.
2. Bridging for roof joists shall be horizontal type except for the bays adjacent to the exterior bays which shall have diagonal bridging unless otherwise shown.
3. Provide bridging anchors for runs terminating at beams or columns.

F. Steel Primer Paint: Fabricator's standard rust-inhibitive primer.

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with SJI. Properly mark materials for field assembly.

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from area of chord when calculating strength of member.

C. Extended Top Chord: Provide extended ends or top chords on joists as shown so as to have sufficient capacity to support loads.

D. Extended Bottom Chord: Provide bottom chord extensions as shown for attachment to beams or columns. Extend ends to within 1/2 inch of member unless otherwise shown.

E. Ceiling Extensions: Provide ceiling extensions in areas having ceiling attached directly to joist bottom chord or as shown. Extend ends to within 1/2 inch of finished wall surface. Extension shall be of sufficient strength to support ceiling construction.

F. Provide bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch in 12 inches.

G. Anchorages: Furnish anchor bolts, weld plates, or other connectors required for securing members to other in-place work.

2.3 SHOP PAINTING

A. After inspecting and before shipping, prepare surfaces by removing loose scale, rust, and other foreign materials. Preparation shall be equivalent to SSPC-SP3 “Power Tool Cleaning.”

B. Immediately after surface preparation, apply one shop coat of primer paint to steel joists and accessories by spraying, dipping, or other methods to provide continuous dry paint film thickness of not less than 1.0 mils.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine conditions under which work shall be erected. Do not proceed until unsatisfactory conditions are corrected.

3.2 ERECTION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction in accordance with SJI and joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using high-strength structural bolts unless noted otherwise in Drawings.

E. Bridging: Install bridging simultaneously with joist erection before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

1. If span of joist exceeds erection stability span indicated by SJI, install required rows of bolted diagonal bridging prior to releasing hoisting cables.
2. Weld joist bridging except bridging for erection stability which shall be bolted.

F. Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI for type of steel joist used unless otherwise shown in drawings.

G. Bolt joists to supporting steel framework in accordance with SJI for type of joists used.

1. Provide unfinished threaded fasteners for bolted connections except where high- strength bolts or welded connections are shown.
2. Provide high-strength threaded fasteners for bolted connections of steel joists to steel columns.

H. Maximum sweep tolerance in inches equals length of joist in feet divided by 40.

3.3 TOUCH-UP PAINTING

A. Repair damaged galvanized coatings with galvanizing repair compound according to ASTM A 780 and manufacturer's written instructions.

B. After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.
3. Remove weld slag before applying touch-up paint.

3.4 TOLERANCES

A. Tolerances shall be within limits of AISC “Code of Standard Practice.”

3.5 PROTECTION

A. Do not use members for storage or work platforms until permanently secured.

B. Do not exceed load capacity of joists with construction loads.

C. Repair or replace members damaged by shipping and handling. Fabricator's representative shall inspect damaged members and provide alternative methods of corrections.

END OF SECTION 05 2100

METAL DECK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Section 05 1200: Structural Steel.

C. Section 05 2100: Steel Joist Framing.

D. Section 03 3025: Concrete Slab on Metal Deck.

1.2 DESCRIPTION OF WORK

A. This section includes steel deck units for floor and roof applications.

B. Header duct used in conjunction with cellular metal floor deck is specified in mechanical section.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with latest edition of:

1. American Iron and Steel Institute (AISI) "Specification for the Design of Cold Formed Steel Structural Members."
2. Steel Deck Institute (SDI).
    a. "Design Manual for Composite Decks, Form Decks, and Roof Decks."
    b. "Diaphragm Design Manual."
3. American Welding Society Inc. (AWS).
    a. AWS D1.1 "Structural Welding Code - Steel."
    b. AWS D1.3 "Structural Welding Code - Sheet Steel."
    c. AWS C5.4 "Recommended Practices for Stud Welding."

B. Qualifications for Welding Work

1. Use qualified welding processes and welding operators in accordance with AWS standards.
2. Provide one of the following certifications for welders to be employed in work.
    a. Certification of satisfactorily passing AWS qualification tests within previous 12 months to perform type of welding in work.
    b. Work record signed by supervisor showing regular employment within previous 12 months to perform type of welding in work.

C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory," with each deck unit bearing the UL label and marking for specific system detailed.

D. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for Class 1, fire-rated construction.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ testing laboratory acceptable to Engineer and Architect to perform material evaluation tests.

B. Submit testing service qualifications demonstrating experience with similar types of projects.

C. See Part 3 Section "Shear Connectors" for testing of shear connector installation at the start of each day's production welding period and after welding equipment has been moved or changed. This testing is to be by the shear connector installer.

D. Contractor shall secure services of company field advisor from manufacturer of powder-actuated or pneumatically driven fasteners used to anchor metal deck. Field advisor shall be certified in writing by manufacturer to be technically qualified in product installation. Personnel involved solely in sales do not qualify. Field advisor shall be present at beginning of installation of product and as required during duration of project to:

1. Render technical assistance to Contractor regarding installation procedures of product to satisfy warrantee or guarantee requirements.
2. Provide specialized training in use of product to Contractor's personnel.
3. Verify correct fastener is being used for each structural substrate type and thickness.
4. Verify proper tools and application procedures.
5. Familiarize Contractor/Owner/Architect/Engineer with entire system, including inspection techniques.
6. Answer questions that arise.

E. Field advisor shall prepare a written report summarizing information listed above. Submit report to Special Inspector, Contractor, Owner, Architect, and Engineer.

F. Contractor shall be responsible for expenses of field advisor and verifying credentials of advisor.

G. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify the RDPs 48 hours before anticipated time of completion for given section of work so that they may determine if site observations are required. If site observations are required, do not conceal metal deck or place concrete slabs until the RDPs have had opportunity to make observations.

1.6 SUBMITTALS

A. General: Review of submittals is for general conformance only. Compliance with requirements for materials, fabricating, erection, and dimensions is Contractor's responsibility.

B. Shop Drawings: Submit detailed drawings showing:

1. Reference Contract Drawing number including addendum number in each shop drawing.
2. Panel layout.
3. Anchorage details showing locations and size of welds or mechanical fasteners if used.
4. Each condition requiring closure panels.
5. Location and attachment of accessories.
6. Supplementary framing furnished and required.
7. Special conditions; opening locations.
8. Side-lap fastening.
9. Material thickness.
10. Deck finish.
11. Cross-section of panel with dimensions.
12. Layout, size, material, and quantity of shear connectors.
13. Panels requiring shoring from panel layout.
14. Powder-actuated corrosion resistant fasteners.

C. Calculations: Submit calculations for powder-actuated fasteners indicating required diaphragm capacity has been provided in accordance with the Performance Requirements section of this Specification and the Drawings.

D. Manufacturer's Data: Submit to Special Inspector and Engineer laboratory test reports and other data as required to show compliance with specifications. Submit producer's or manufacturer's specifications and installation instructions for the following products:

1. Sheet steel deck, including certified copies of mill reports covering chemical and physical properties.
2. Shop primer paint if used.
3. Welding electrodes.
4. Mechanical and side-lap fasteners.
5. Shear connectors.

1.7 PERFORMANCE REQUIREMENTS

A. Anchor roof deck to resist uplift loading:

1. Eave Overhangs: 45 pounds per square foot.
2. Other Roof Areas: 30 pounds per square foot.

B. Install and anchor deck to develop 240 pounds per linear foot of diaphragm shear resistance unless noted otherwise on drawings.

1.8 PRODUCT HANDLING

A. Store materials in approximately horizontal position on supports above ground with one end elevated for drainage.

B. Protect from weather, and keep free of dirt and debris.

C. Ventilate to avoid condensation.

D. Handle material carefully so it is not bent or marred.

E. Replace damaged materials at no cost to Owner.

1.9 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 DECK MATERIALS

A. Materials shall be new and free from rust.

B. Galvanized Steel Deck: ASTM A 653, with galvanized coating Designation G 60. Minimum 40,000 psi yield strength.

C. Galvanized and Painted (Shop-primed) Steel Deck: ASTM A 653, with galvanized coating Designation G 60, extra smooth, with no oil preservatives. Cleaned and phosphatized, with one coat of shop primer. Areas of metal deck to be galvanized and shop primed are indicated in the drawings. Minimum 40,000 psi yield strength.

D. Roof Deck Units:

1. 1 ½" Deep Deck: Type: "B" and Type "BA" (acoustical) by Canam, Vulcraft, New Millennium, or accepted equivalent as indicated on the drawings.
2. 3" Deep Deck: Type "N" and Type "NA" (acoustical) by Canam, Vulcraft, New Millennium, or accepted equivalent as indicated on the drawings.
3. 4 ½" Deep Cellular Acoustic Deck: Type "JCAS" by Canam; "Deep-Dek 4.5 Cellular Acoustical by New Millenium; or accepted equivalent.
4. 1" Deep Form Deck: Type "UF1X" by Canam; "1.0E" by Vulcraft; "HD-Dek" by New Millenium; or accepted equivalent.

4. Size: As shown in drawings.
5. Finish: Galvanized unless noted otherwise in drawings.

F. Composite Floor Deck Units:

1. Type: “N-Lok or Lok-Floor” by Canam; “VL” by Vulcraft; “Composite Floor-Dek” by New Millennium; or accepted equivalent.
2. Size: As shown in drawings.
3. Finish: Galvanized unless noted otherwise in drawings.
4. Provide deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Open-beam deck units shall have fluted section with interlocking side laps.

2.2. ACCESSORIES

A. General: Provide manufacturer’s standard accessory materials for deck that comply with requirements indicated.

B. Structural Shapes, Bars, and Plates: ASTM A 36. Refer to Section 05 1200.

C. Shear Connectors: Headed stud-type, 3/4-inch-diameter, ASTM A 108 Grades 1010 through 1020, solid fluxed and in accordance with AWS. Provide Type B studs having a minimum yield strength of 50,000 psi, in accordance with AWS D1.1. An arc shield (ferrule) shall be used with each connector. Provide shear connections meeting the following size criteria unless noted otherwise in Drawings:

1. Minimum of 3 inches long.
2. Lengths to provide a minimum of one inch concrete cover over top of connectors.
3. Connector to project a minimum of 1 1/2 inches above top of deck.

D. Electrodes: In accordance with AWS.

E. Welding Washers: As required by deck manufacturer.

F. Mechanical Fasteners: Corrosion-resistant, low-velocity, powder-actuated, or pneumatically driven carbon steel fasteners or self-tapping screws.

1. “X-ENP-19 L15” or “X-HSN-24” powder-actuated fasteners by Hilti, or accepted equivalent.

G. Sidelap Fasteners: Corrosion-resistance, hexagonal washer head: self-tapping, carbon steel screws. No. 10 minimum diameter.

H. Sheet Metal Accessories: ASTM A 653, SS Grade 33, commercial-quality steel sheets with G 60 galvanized coating.

1. Pour stops and Girder Fillers: Provide 16-gauge-minimum thickness unless noted otherwise.
2. Metal Cover Plates: Not less than thickness of deck.
3. Metal Cell Closures: Provide 18-gauge-minimum (0.045-inch) thickness.
4. Roof Sump Pans: Provide 14-gauge-minimum (0.0747) thickness.
5. Provide 20-gauge-minimum thickness for other accessories unless noted otherwise.

I. Flexible Cell Closures: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

J. Acoustic Sound Barrier Closures: Manufacturer's standard mineral-fiber closures.

K. Shop Primer Paint: For application to metal surfaces chemically cleaned and phosphate chemical treated.

1. “Valspar Low Cure Epoxy 88107-7197”, “Akzo Noble 9X4444”, or accepted equivalent.
2. Comply with the adhesion performance requirements of ASTM D 3359, Methods A and B with a 5A rating.

L. Touch-up Material:

1. Galvanizing Touch-up Compound: “ZRC Galvilite” by ZRC Worldwide; “Roval ZC Galvanizing Repair” by Roval Corporation; or accepted equivalent. Use for field touch-up of galvanized sheet

metal.

2. Steel Primer Paint: Use primer compatible with finish paint specified in Division 9 for repair of painted surfaces.

2.3 FABRICATION

A. General: Form deck units in lengths to span three or more supports.

1. Provide flush or 2-inch nested end laps for roof deck, except at joists provide 4-inch nested end laps.
2. Provide flush end laps for floor deck.
3. Use nested side laps.
4. Prior to shipping decking to job site, manufacturer shall wire-brush, grind, clean, and paint scarred areas (weld marks on cellular deck, scratches, rust spots, etc.) on top and bottom surfaces of decking units.
    a. Touch up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
    b. Touch up painted surfaces with shop primer paint applied in accordance with manufacturer's instructions.
    c. Galvanized and painted steel deck shall be first touched up with galvanizing repair paint. After paint has cured, touch up with shop primer paint.
    d. Unrepaired scarred areas will be evaluated by Architect and may be cause for rejection of deck units.

B. Cellular Acoustical Metal Deck:

1. Fabricate cellular units with a top fluted section combined on a bottom flat plate section having interlocking side laps and approximate 5/32-inch perforations staggered at 3/8-inch centers under cells formed by top plate section. Provide manufacturer’s mineral-fiber acoustical insulation strips of profile to fit void space of each cell.
2. Gauge of bottom flat plate section to match gauge of top fluted plate section as indicated on the drawings.

C. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units. Form to match contour of deck units and approximately 6 inches wide.

D. Metal Cell Closures: Fabricate metal closure strips for cell raceways and openings between decking and other construction. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

E. Roof Sump Pans: Fabricate from single piece of sheet steel with level bottoms and sloping sides to direct water flow to drain. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide. Recess pans not less than 1½ inches below roof deck surface unless otherwise shown or required by deck configuration. Holes for drain will be field cut by others.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine conditions under which work shall be erected. Do not proceed until unsatisfactory conditions are corrected.

3.2 ERECTION

A. General: Install deck and accessories in accordance with manufacturer's recommendations, and accepted shop drawings.

B. Cut and fit units and accessories around projections through decking. Make cuts neat and square.

C. Do not use cutting torches.

D. Position deck on supporting steel framework and adjust to final position with ends bearing a minimum of 2 inches on supporting members and accurately aligned end to end before being permanently fastened.

E. Do not install deck in a single span condition unless noted otherwise in Drawings. Lay out deck to provide a minimum two-span condition. Notify Engineer if single span deck is required.

F. Do not stretch or contract side-lap interlocks.

G. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

H. Place deck units flat and square, secured to adjacent framing without warp or deflection.

I. At beams to receive shear connectors and pour stops, lap pour stop 2 inches onto beam flange and butt deck to pour stop. Do not lap deck onto pour stop. Locate shear connectors on the opposite side of the beam flange from pour stop.

J. Do not place deck units on concrete supporting structure until concrete has cured and dried.

K. Coordinate and cooperate with structural steel erector in locating deck bundles to prevent overloading of structural members.

L. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members to resist forces listed under Performance Requirements. Minimum fastening shall be by nominal 5/8-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches on center with minimum of three welds a unit at each support.

2. Fasten roof deck units to steel supporting members to resist forces listed in drawings or under performance requirements. Minimum fastening shall be by nominal 5/8-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches at every support and closer where indicated. In addition, secure deck to each supporting member in ribs where side laps occur.

3. Comply with AWS requirements and procedures for manual shielded metal arc- welding, appearance and quality of welds, and methods used in correcting welding work.

    a. Use welding washers where recommended by deck manufacturer.

4. Mechanical fasteners may be used in lieu of welding. Locate fasteners and install in accordance with the manufacturer's accepted submittal.

5. Mechanically fasten side laps of adjacent deck units between supports at intervals not exceeding 36 inches on center using No. 10 or larger self-tapping screws unless otherwise specified by manufacturer. Button punching not permitted.

6. Keep the interiors of cells that will be used as raceways free of welds having sharp points or edges.

M. Pour Stops and Girder Fillers: Install pour stops and girder fillers at edges of slabs and in voids between decking and other construction.

1. Weld pour stops and girder fillers at 6 inches on center. Butt joints tight and weld top and bottom.

N. Cell closures: Install metal cell closures at open uncovered ends and edges of decking to provide complete decking installation.

1. Fasten using tack weld or install No. 10 or larger self-tapping screws at 4 feet on center.

2. At Contractor’s option, provide flexible cell closures instead of metal cell closures wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

O. Hanger Slots or Clips: Provide UL-approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.

1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
2. Locate slots or clips at not more than 14 inches on center in both directions, not over 9 inches from walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.
3. Provide manufacturer's standard hanger attachment devices.

P. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units except where taped joints are required.

Q. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12 inches on center with at least one weld at each corner.

R. Ridge and Valley Plates: Weld ridge and valley plates to top surface of roof decking.

1. Lap end joints not less than 3 inches with laps in direction of water flow.

3.3 DECK REINFORCEMENT

A. Unless noted otherwise, reinforce roof deck as follows:

1. For deck openings less than 15 inches wide and not supported by structural members, fabricate from minimum 18-gauge, galvanized sheet metal. Fusion-weld to bottom surface of deck and extend at least 12 inches wider and longer than opening. Weld at each corner, and provide two welds to each rib crossed. Weld edges parallel with deck at 12 inches on center.
2. For deck openings from 15 inches to 30 inches wide and not supported by structural members, weld 2-inch x 2-inch x 1/4-inch steel angle to underside of deck at right angles to deck ribs. Extend angles three ribs beyond each side of opening and puddle weld. Reinforce side of opening parallel to ribs with 18-gauge sheet metal 12 inches wide placed on bottom surface of decking. Weld plate at each corner and at 12 inches on center along edges.
3. For deck openings greater than 30 inches wide, provide structural steel for edge support around entire opening. Frame into adjacent structural members.
4. For sleeved penetrations smaller than rib width, no reinforcing is required.

B. Unless noted otherwise, reinforce composite floor deck as follows:

1. For deck openings up to 24 inches wide and not supported by structural members, provide additional two, No. 5 bar slab reinforcing each side of openings as shown in drawings.
2. For deck openings greater than 24 inches wide, provide structural steel for edge support around entire opening, except where a side is within 12 inches of another framing member. Frame into adjacent structural members.
3. For sleeved penetrations smaller than rib width, no reinforcing is required.
4. At openings in composite decks not supported by structural members, form openings in slab, but do not cut deck until slab strength reaches 75 percent of its design strength or until needed by trade requiring the opening.

3.4 SHEAR CONNECTORS

A. General: Installation shall be in accordance with AWS Code, using automatically timed connector welding equipment.

B. Clean welding surface before installing connectors.

C. Lay out shear connectors prior to welding.

D. For beams perpendicular to deck span, distribute shear connectors as follows unless noted otherwise:

1. Equally space (approximately) connectors in one row along beam at a maximum spacing of 2 feet on center. Notify Engineer if there are insufficient connectors to space at 2 feet on center throughout the length of the beam.
2. If there are connectors remaining, assign one connector to every other rib without a connector starting at each end of beam.

3. If there are still connectors remaining, assign one connector to each rib without a connector, again starting at each end of beam.
4. If number of connectors exceeds number of ribs, assign one connector to each rib. Assign a second connector to each rib starting at each end of beam until all connectors are used. Weld connectors only after assigning is completed.
5. Do not center connectors in ribs with rib stiffeners. Offset connectors to the side of each rib closest to the nearest beam end.

E. For beams parallel to deck span, distribute shear connectors as follows unless noted otherwise:
1. Equally space total number of connectors in one row along beam.
2. Connector spacing along beam shall not be closer than 4 1/2 inches on center.
3. For one row of connectors, locate connectors over beam web. For two rows of connectors, locate each row 1½ inches from center of beam web (3 inch gauge).

F. At start of each day's production welding period and after welding equipment has been moved or changed, weld and test two test connectors. These connectors shall be bent to an angle of 30 degrees from vertical by striking with a hammer. If failure occurs in weld zone of either connector, correct or adjust welding operation. Two consecutive connectors shall be welded and found satisfactory before production welding can begin.
1. Where connectors are welded through metal deck, ten connectors shall be tested as described above. Connectors shall be on the same beam and through the same deck type and thickness. Ten consecutive connectors shall be welded and found satisfactory before production welding can begin.
2. Connector tests shall be performed each time conditions change (i.e., no deck to through deck, through one thickness or layer of deck to another thickness or multiple layers of deck, change of deck types).

G. Replace connectors that fail inspection by Testing/Inspecting Agency at no expense to Owner.

H. Break ferrules away from connectors.

I. Do not weld when air temperature is below 0 degrees F or when welding surface is wet.

J. Beam top flange shall not be painted or galvanized in area of connector welding. Remove paint, galvanized coating, rust, and debris prior to welding connectors.

K. Number of shear connectors shown in drawings is based on deck type and size specified. Should deck be installed with characteristics different than specified deck, number of shear connectors shall be increased to provide equivalent capacity at no additional expense to Owner.

3.5 TOUCH-UP PAINTING

A. After installing decking, wire-brush, clean, and paint scarred areas (scratches, weld burn marks, etc.), welds (shop and field), and rust spots on top and bottom surfaces of decking units and supporting steel members.
1. Touch-up paint damaged galvanized surfaces and welded areas with galvanizing touch-up compound applied in accordance with manufacturer's instructions.
2. Touch-up paint damaged shop priming coats with shop primer paint applied in accordance with manufacturer's instructions.
3. Galvanized and painted steel deck shall be first touched up with galvanizing touch-up compound. After paint has cured, touch up with shop primer paint.

B. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.7 PROTECTION AND LOADING

A. Do not use units for storage or for work platforms until deck is permanently secured to the supporting

structure.

B. Do not exceed load capacity of deck with construction loads. Limit temporary construction loads to 20 psf.

C. Before concrete placement, check welds. Reweld broken or damaged welds.

D. Do not suspend mechanical, electrical, or plumbing items from roof or floor form deck. Suspend loads directly from main framing or from supplemental framing installed between main framing.

1. Refer to mechanical, electrical, and plumbing specifications for hangers and supplemental framing required to attach these items to main framing.

3.8 TOLERANCES

A. Maximum variation in deck unit alignment shall be 1/4 inch in 40 feet.

END OF SECTION 05 3000

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

B. Section 05 5000 "Metal Fabrications" for masonry shelf angles and connections.

C. Section 09 2116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

D. Section 09 2216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.2 DESCRIPTION OF WORK

A. This section includes the following types of cold-formed metal framing:

1. Exterior load-bearing wall framing.
2. Parapet wall framing.
3. Exterior non-load-bearing wall framing.
4. Sloped roof framing.
5. Soffit framing.
6. Manufacturer’s accessories.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with latest editions of:

1. AISI S100 “North American Specification for the Design of Cold-Formed Steel Structural Members”.
2. AISI S200 “North American Standard for Cold-Formed Steel Framing – General Provisions”.
3. AISI S201 “North American Standard for Cold-Formed Steel Framing – Product Standard”.
4. AISI S210 “North American Standard for Cold-Formed Steel Framing – Floor and Roof System Design”.
5. AISI S211 “North American Standard for Cold-Formed Steel Framing – Wall Stud Design”.
6. AISI S212 “North American Standard for Cold-Formed Steel Framing – Header Design”.
7. AISI S213 “North American Standard for Cold-Formed Steel Framing – Lateral Design”.
8. AISI “Code of Standard Practice for Cold-Formed Steel Structural Framing”.
9. American Welding Society, Inc. (AWS): AWS D1.1 “Structural Welding Code - Steel” and AWS D1.3 “Structural Welding Code - Sheet Steel.”
10. American Society for Testing and Materials (ASTM):
    a. ASTM C 1007 "Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.”
    b. ASTM A653 “Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.”
    c. ASTM A780 “Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.”

B. Qualifications for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS standards.
    a. AWS D1.1, "Structural Welding Code - Steel."
    b. AWS D1.3, "Structural Welding Code - Sheet Steel."

2. Provide one of the following certifications for welders to be employed in the work:
    a. Certification of satisfactorily passing AWS qualification tests within previous 12 months to perform type of welding in work.
    b. Work record signed by supervisor showing regular employment within previous 12 months to perform type of welding in work.

C. Qualifications for Fabricator and Installer:
1. Installer of cold-formed metal framing shall have minimum 3-years experience in installation of cold-formed metal framing on projects similar in material, design, and size to this project.
2. Submit written description of ability.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 for testing indicated.

E. Usually retain mill certifications or test reports from a qualified testing agency below. Insert option of test reports from in-house testing with calibrated test equipment if permitted. Insert option for testing ductility if required. See "Mill Certification" Paragraph in "Materials" Article in the Evaluations for more information.

F. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

G. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating including those required for compliance with governing regulations, provide units that have been approved by governing authorities having jurisdiction.

H. Preinstallation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work, including structural steel, door and window frames, mechanical, and electrical work. Review areas of potential interference and conflicts. Coordinate layout and support provisions for interfacing work.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and the Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ a testing laboratory acceptable to Engineer and Architect to perform material evaluation tests.

B. Submit testing service qualifications demonstrating experience with similar types of projects.

C. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit the construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion for a given section of work so they may determine if site observations are required. If site observations are required, do not conceal framing until RDPs have had an opportunity to make observations.

1.6 SUBMITTALS

A. Shop Drawings: Submit detailed drawings showing:
1. Reference Contract Drawing number and addendum number in each shop drawing.
2. Cold Formed Metal Wall Framing:
    a. Include complete layout of framing, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Provide building elevations showing framing layout including shop-fabricated panels.

b. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, bridging anchorage for axial load bearing studs, splices, accessories, connection details, and attachment to adjoining work.

B. Material Data: Submit to Special Inspector and Engineer laboratory test reports and other data as required to show compliance with specifications based on evaluation of comprehensive tests for current products. Submit producer's or manufacturer's specifications and installation instructions for the following:

1. Product data and installation instructions for each item of cold-formed metal framing and accessories, including manufacturer's suggested capacities and certified test data.
2. Mill certificates signed by steel sheet producer or test reports from qualified independent Testing Agency indicating steel sheet complies with specified requirements.
3. Certification that framing members have equivalent or greater capacities and properties than specified performance requirements.
4. Welding certificates and electrodes.
5. Product data for screws, bolts, and other fasteners used.
6. Post installed anchors (expansion, sleeve, or chemical adhesive) if used.
7. Mechanical fasteners.
8. Vertical deflection clips.
9. Horizontal drift deflection clips.
10. Miscellaneous structural clips and accessories.
11. Research reports: For non-standard cold-formed steel framing, from ICC-ES.

C. Qualification Data: Submit to Special Inspector and Engineer data for firms and persons specified in "Quality Assurance" paragraph 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.

D. Coordination Drawings: Submit plans, elevations, sections, and details illustrating interface and anchorage of manufactured wall panels to cold-formed metal framing system.

1.7 PRODUCT HANDLING

A. Store materials in approximately horizontal position on supports above ground with one end elevated for drainage.

B. Protect from weather, and keep free of dirt and debris.

C. Ventilate to avoid condensation.

D. Handle material carefully so it is not bent or marred.

E. Replace damaged materials at no cost to Owner.

1.8 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As noted on the drawings.
2. Coating: Provide galvanized finish to metal framing components complying with ASTM A 653 for minimum G60 coating. Provide minimum G90 coating for exposed exterior environments.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, grade 50 and zinc coated (G60).

C. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and section properties as indicated on the drawings.

D. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs, unless thicker material is required by structural performance.
2. Flange Width: 1-1/4 inch minimum.

E. Box Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and section properties as indicated on drawings.

F. Wall Bridging:

1. Channel Bridging Inside Wall: 1-1/2 inch web, 1/2 inch flanges, 0.0342 inch uncoated thickness and G-90 hot-dipped galvanized coating according to ASTM A 123. Attach to studs as required by structural design calculations.
2. Flat Strap: Width and thickness as required by structural design calculations.
3. Solid Bridging: Channel-shaped bridging with lipped flanges and integral formed clips. Size and gauge as required by structural design calculations.

G. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating required out-of-plan loading and upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

H. 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, and as follows:

1. Minimum Base-Metal Thickness: 68 mil (14 Ga) for exterior conditions and 43 mil (18 Ga) for interior conditions, unless noted otherwise.
2. Flange Width: 1 inch plus twice the design gap – with minimum 1-1/2” overlap on stud.

I. 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, and as follows:
   a. Minimum Base-Metal Thickness: 68 mil (14 Ga) for exterior conditions and 43 mil (18 Ga) for interior conditions, unless noted otherwise.
   b. Flange Width: 1 inch plus twice the design gap.
2. Inner Track: Of web depth indicated, and as follows:
   a. Minimum Base-Metal Thickness: Match stud thickness, unless noted otherwise.
   b. Flange Width: Outer deflection track flange width plus 1 inch.

J. 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.

K. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and section properties as indicated on drawings.

2.2 ACCESSORIES

A. Fasteners:

1. Screws: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws in accordance with manufacturer's recommendations for size and spacing unless detailed otherwise in drawings.

a. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2. Bolts and Nuts: ASTM A 307.

3. Finish: Corrosion-resistant, plated finish.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.

2. Bracing, bridging, and solid blocking.

3. Web stiffeners.

4. Anchor clips.

5. End clips.

6. Foundation clips.

7. Stud kickers and knee braces.

8. Hole reinforcing plates.

9. Backer plates.

C. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

D. Welding Electrodes: As permitted by AWS.

E. Power-Actuated Fasteners: 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 the design load as determined by testing in accordance with ASTM E 1190, performed by a qualified independent Testing Agency.

F. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

1. “Kwik-Bolt 3” by Hilti; “Trubolt Wedge Anchors” by ITW Ramset/Red Head; “Power-Stud” by Powers Fasteners; “Wedge-Al” by Simpson/Strong-Tie; or accepted equivalent.

G. Steel Shapes and Clips: Provided under Section 05 1200; installed under this section.

2.3 MISCELLANEOUS MATERIALS

A. Galvanizing Touch-up Compound: “ZRC Galvilite” bu ZRC Worldwide; “roval ZC Galvanizing Repair” by Roval Corporation; or accepted equivalent. Use for field touch-up of galvanized sheet metal.

B. 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.

C. 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.

2.4 FABRICATION

A. General: Prefabricate framing components into assemblies before erection wherever possible. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.

B. Fabricate units in jig templates to hold members in proper alignment and position and to ensure consistent component placement.

C. Fastenings: Attach components by welding, bolting, or screw fasteners as standard with manufacturer unless noted otherwise in drawings.

D. Wire-tying of framing components shall not be permitted.

E. Welds shall be fillet, plug, butt, or seam unless noted otherwise. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding

work.

F. Cut framing components squarely or on an angle required to fit tightly with proper bearing against abutting members. Maintain members firmly in position until permanently fastened.

G. Wire-brush shop welds clean, and apply galvanizing repair paint in accordance with ASTM A 780 and manufacturer's written instructions.

H. 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. Space individual framing members within plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finish materials.

2. Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

3. Length of end bearing members shall be within plus or minus 1/16 inch of length shown.

PART 3 EXECUTION

3.1 INSTALLATION / ERECTION

A. General: Examine conditions under which work shall be erected. Do not proceed until unsatisfactory conditions are corrected.

B. Install cold-formed framing in accordance with ASTM C1007, AISI S200 "North American Standard for Cold-Formed Steel Framing - General Provisions", and the manufacturer's written instructions, whichever is more stringent.

C. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

D. Handling and lifting of members or prefabricated panels shall be done in a manner to not cause distortion in members. Lift only at points indicated in Shop Drawings.

E. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as shown in drawings, except do not exceed 24 inches on center spacing for nail or power-driven fasteners or 16 inches on center for other types of attachment. Provide fasteners at corners and ends of tracks.

1. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab to ensure a uniform bearing surface on supporting concrete or masonry construction.

F. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt-welded or spliced together.

G. Installation of Wall Studs: Secure studs to top and bottom runner tracks by either welding or screw-fastening at both inside and outside flanges as shown in drawings. Do not screw or weld non-load bearing studs to vertical deflection clips or deflection slip tracks.

1. Set studs plumb except as needed for diagonal bracing or as required for nonplumb walls or warped surfaces and similar requirements.

2. 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 follows:

a. Stud Spacing: As indicated in structural drawings and approved shop drawings.

3. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

4. Align studs vertically where floor framing interrupts load-bearing wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

5. Align floor and roof framing over load-bearing studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

6. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of

bridging to supporting structure.

7. 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.
8. 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.
9. 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.
10. Install horizontal bridging in stud system, spaced vertically 48 inches or as indicated on structural drawings. Fasten at each stud intersection and anchor bridging lines to bottom and/or top tracks as indicated.
    a. 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 8 inches deep.
    b. 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.
    c. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
11. 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 wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards, considering weight or loading resulting from item supported.
12. Install steel sheet diagonal bracing straps for bridging anchorage 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.
13. 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.
14. Frame both sides of expansion and control joints with separate studs. Do not bridge the joint with components of stud system.
15. Framing system shall be constructed to maintain clearances to allow for construction tolerances and to accommodate live load deflection of primary building structure as indicated in drawings.

H. Bridging, blocking, and sheathing shall be in place prior to loading roof framing.

I. Cutting of flanges in stud and header framing members shall not be permitted.

J. Splicing of stud and header framing members shall not be permitted.

3.2 ERECTION TOLERANCES

A. Framing and prefabricated assemblies:
1. Length of end bearing members: $\pm$ 1/16 inch.
2. Vertical alignment of studs: $\pm$ 1/8 inch in 10 feet.
3. Horizontal alignment of walls: $\pm$ 1/8 inch in 10 feet; 1/4-inch maximum deviation from theoretical line.
4. Framing spacing: $\pm$ 1/8 inch from design spacing; 1/2-inch maximum cumulative error.
5. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/4 inch.

B. Bolt or weld wall panels at both horizontal and vertical junctures to produce flush, even, true-to-line

joints.

3.3 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. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 TOUCH-UP PAINTING

A. After installing framing, wire-brush, clean, and paint scarred areas (scratches, weld burn marks, etc.), welds (shop and field), and rust spots on both surfaces of framing units and supporting steel members.

1. Touch up paint-damaged galvanized surfaces and welded areas with galvanizing touch-up compound in accordance with manufacturer's instructions.

END OF SECTION 05 4000

METAL FABRICATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Steel framing and supports for mechanical roof support systems, gymnasium equipment supports, scoreboard, divider curtains, and framing supports and bracing for screens, and similar items indicated on drawings.

B. Steel framing and supports for framing and supports for rolling grills.

C. Steel framing and supports for applications where framing and supports are not specified in other Sections.

D. Loose lintel where required, shown on drawings or for work under this section.

E. Elevator machine hoist beams.

F. Support angles for elevator door sills.

G. Steel weld plates and angles for casting into concrete not specified in other Sections.

H. Elevator pit steel ladder.

I. Metal bollards.

J. Abrasive metal nosing for concrete stairs.

K. Pit Covers

L. Slotted channel framing.

M. Projector Mounts.

N. Television mounting brackets

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

C. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.

D. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

E. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

F. Section 005 4000 - Cold-Formed Metal Framing.

G. Section 05 5100 - Metal Stairs.

H. Section 05 5213 - Pipe and Tube Railings.

I. Division 7 for roofing and sheet metal flashings for roof penetrations and installations associated with steel support roof framing.

J. Section 09 2116 - Gypsum Board Assemblies for miscellaneous framing associated with metal stud framing .

K. Section 09 9113 - Exterior Painting.

L. Section 09 9123 - Interior Painting.

M. Section 14 2100 - Electric Traction Elevators for miscellaneous framing required for elevator installation.

N. Section 14 2400 - Hydraulic Elevators for miscellaneous framing required for elevator installation.

1.4 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014 (Editorial 2017).

H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

J. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.

K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

L. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

M. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.

N. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

Q. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

R. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

S. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

1.5 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. 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

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For the following:

1. Metal nosing and treads.
2. Elevator pit ladder.

3. Metal bollards.
4. Metal downspout boots.
5. Projection mounts and associated supports.
6. Miscellaneous framing for gymnasium equipment.
7. Gymnasium perforated grills
8. Roof supports.
9. Miscellaneous framing for scoreboard..

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.

D. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.7 QUALITY ASSURANCE

A. Design engineering under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in New York.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent

C. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.9 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

I. Touch-'Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H34 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.

D. Bolts, Nuts, and Washers: Stainless steel.

2.3 MATERIALS - STAINLESS STEEL

A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316L.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

2.4 FABRICATION

A. Shop Assembly: Preassemble rolled steel members in the shop. Other items also preassemble in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

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

D. Fit and shop assemble items in largest practical sections, for delivery to site.

E. Fabricate items with joints tightly fitted and secured.

F. Continuously seal joined members by continuous welds.

G. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Do not use ferrous material and equipment on stainless steel components.
3. Obtain fusion without undercut or overlap.
4. Remove welding flux immediately.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface

H. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep hole es where water may accumulate

I. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

J. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

K. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.5 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

C. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5
2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594

2.6 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; painted finish.

1. Comply with ANSI A14.3, unless otherwise indicated.
    a. For elevator pit ladders, comply with ASME A17.1.
    b. Side Rails: 3/8 x 2 inches (9 x 50 mm) members spaced at 20 inches (500 mm). Extend a minimum 42" above finish floor level.
    c. Rungs: 3/4 inch (- mm) diameter solid round bar spaced 12 inches (300 mm) on center.
    d. Space rungs 7 inches (175 mm) from wall surface.
    e. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung by a proprietary process

B. Fixed Bollards:

1. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
2. Diameter: 6 inches
3. Material: Schedule 40 steel pipe galvanized
4. Cap bollards with prefabricated 1/4-inch- thick steel cone cap.
5. Sleeves steel pipe 1/4-inch thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
6. Concrete filled for fixed bollards.
7. Polyethylene Plastic Covers: High-density polyethylene (HDPE).
    a. Color as selected by the Architect.
8. Product: Basis of Design Distributor: Reliance Foundry Company; 1-8877-789-3245. www.reliance-foundry.com.
9. Use where shown on drawings.

C. Custom Column Guards:
   1. Circular guards for concrete columns.
   2. Diameter: 4".
   3. Material: Stainless steel Type 316L.
   4. Anchor bolts: Stainless steel; 1-1/2" diameter x 8" long.
   5. Use where shown on drawings.

D. Lintels: As detailed. Finish: Prime paint interior lintels; galvanized for exterior lintels. Refer to Section 9000 - Painting and Coating.
   1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated
   2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
   3. Galvanize loose steel lintels located in exterior walls.

E. Pit Frame and Grating: Provide aluminum grating sump pit cover and frame for elevator pit.
   1. Coordinate with elevator and plumbing drawings.
   2. Product: Balco Inc Wichita, KS 67217, 800.767.0082, MR-10A or equal.

F. Elevator Hoistway Beams: Beam sections as indicated on drawings; prime paint finish.

G. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
   1. Size of Channels: 1-5/8 by 1-5/8 inches.
   2. Material: Steel complying with ASTM A 1008/A 1008M, commercial steel, Type B; 0.0677-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel. Color as selected by Architect.
   3. Provide where shown on drawings
   4. Basis of Design: . UniStrut P-1000 Channesl
      a. Rods: 1/2 diameter.
      b. Fittings: "U" shape 13/16" x 2-15/16".

H. Projector mount
   1. Ceiling mounted
      a. Minimum 1-1/2” diameter schedule 10 NPT pipe, threaded and slotted on each end..
      b. Provide miscellaneous framing as required to support ceiling mount from existing steel joists.
      c. Provide mounting pipes as required to provide the required height.
      d. Mount shall support a minimum of 26 lbs.
      e. Provide 10 gauge cold rolled ceiling plate
      f. Provide safety belts to secure projector in place.
      g. Mount shall be capable of 360° swivel and 0-30° tilting.
      h. Finish shall be black.
      i. Provide where shown on drawings: 44 ½” Length.
      j. Product:“Aero Accuset” as manufactured by Draper, Inc.

I. Television Mounting Brackets:
   1. Ceiling Mounted.
      a. Ceiling mounted. Model #CMY-3140 as manufactured by Da-Lite Screen Company.
      b. Provide hardware kits for concrete and uni-strut support..
      c. Mount shall support a max. of 300 lbs.
      d. Provide pipe coupling and escustion ring. Lengths as required.

e. Provide safety belts to secure monitor in place.
f. Mount shall be capable of 360 degrees swivel and 0-15 degrees tilting.
g. Finish shall be black.
h. Product: "Model #CMY-3140" as manufactured by Da-Lite Screen Company.
i. Provide where shown on drawings: 44 ½" Length.

J. Abrasive Metal Nosings.
1. Cast aluminum stair nosing, with abrasive filler consisting of #24 virgin grain silicon carbide in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions
2. Surface Design: Cast aluminum solid surface tread plate 3/8 inch thick.
3. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
a. Space anchors 3" from ends and 12" oc.
4. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete
5. Available Manufacturers:
a. American Safety Tread Co., Inc., Style 801, with aluminum cast wing anchor

2.7 DOWNSPOUT BOOTS

A. Downspout Boots: Smooth interior without boxed corners or choke points; include cleanout cover and tamper proof fasteners.
1. Configuration: Straight.
2. Material: Cast Aluminum.
3. Size: 4" x 6".
4. Outlet: Circular to discharge into drainage system. Coordinate with site work.
5. Finish: Manufacturer's standard factory applied powder coat finish.
6. Color: To be selected by Fuller and D'Angelo P.C. from manufacturer's standard range.
7. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
8. Product:
a. "Type B25C" as manufactured by Barry Craft Construction Casting Company; 1-800-524-1809..
b. Substitutions: Section 01 2500 Substitution Procedures .

2.8 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

C. Exterior Ferous Metal: Galvanizing of Structural Steel Members after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft (530 g/sq m) galvanized coating.

D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.10 FINISHES - STEEL

A. Refer to Section 09 9113 Exterior Painting and 09 9123 Interior Painting.

B. Prime paint steel items.

C. Prepare surfaces to be primed in accordance with SSPC-SP2.

D. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

E. Prime Painting: One coat.
   1. Interior ferrous metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664
   2. Exterior ferrous metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.
      a. Finish shall be black.
   3. Touch-'Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
   4. Exterior Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat
   5. Dunnage to receive primer and Tnemic weatherproof topcoat.

F. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft (530 g/sq m) galvanized coating.
   1. Fastener Locations:
      a. Locations as shown on drawings.

G. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.11 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Interior Aluminum Surfaces: Mill finish.

C. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system; color as indicated.

D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.12 STAINLESS-STEEL FINISHES

A. Use only stainless steel tools, grinders and polishing materials.

B. Remove tool and die marks and stretch lines or blend into finish

C. Unless otherwise indicated, grind and polish surfaces to produce uniform finish indicated, free of cross scratches

D. Directional Satin Finish: Type 316L.

E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean

2.13 FABRICATION TOLERANCES

A. Squareness: 1/16 inch (- mm) maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).

C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).

D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).

E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

A. Install fabricated items as per manufacturer's instructions

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components as indicated on drawings.

E. Perform field welding in accordance with AWS D1.1/D1.1M.

F. Obtain approval prior to site cutting or making adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/8 inch (3 mm).

C. Maximum Out-of-Position: 1/8 inch (3 mm).

END OF SECTION

METAL STAIRS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Concrete-filled steel pan treads

B. Steel preparation for painting.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

C. Section 05 5213 - Pipe and Tube Railings: Metal posts, handrails guardrails etc. for the stairs specified in this section.

D. Section 09 9123 - Interior Painting: Paint finish.

1.4 REFERENCE STANDARDS

A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

B. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2017.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

F. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.

G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

I. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

J. ASTM A 570/A 570M, Grade 30, Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569/A 569M; or structural quality, unless another grade is required by design loads.

K. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

L. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates; 2015.

M. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.

N. 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; 2017.

O. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

P. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

Q. ASTM E 894: - Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.

R. ASTM E935: - Standard Test Method for Performance of Permanent Metal Railing Systems and Rails for Buildings.

S. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

T. New York State Building Code.

U. NAAMM AMP 510 - Metal Stairs Manual; 1992.

V. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

W. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Metal-pan stair treads.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Include plans, elevations, sections, and details of metal stairs and their connections. Include angle post supports and angle hangars for intermediate landings welded to floor bearing.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   3. Include NYS licensed engineer's stamp or seal on each sheet of shop drawings.
   4. Show all retainer channels and connections for wire mesh infill panels.

D. Welders' Certificates.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

F. Qualification Data: For professional engineer.

G. Structural calculations sealed and signed by professional engineer.

1.6 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Uniform Load: 100 lbf/sq. ft.
   2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
   3. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
   4. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch (6.4 mm), whichever is less.

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:
   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
      a. Concentrated load of 200 lbf applied at any point and in any direction.

b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
   a. Concentrated load of 200 lbf applied at any point and in any direction.
   b. Uniform load of 50 lbf/ft. applied in any direction.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
   a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

1.7 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in New York, or personnel under direct supervision of such an engineer.
   1. Engineering services are defined as those performed for installations of handrails and railing systems that are similar to those indicated for this Project in material, design, and extent.
   2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

C. Fabricator Qualifications: A qualified steel fabricator with a minimum of ten (10) years experienced in producing metal stairs similar to those indicated for this Project that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).
   1. AWS D1.1, "Structural Welding Code--Steel AWS D1.3, "Structural Welding Code--Sheet Steel
   2. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.
   3. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections

D. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

1.8 COORDINATION

A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation

PART 2 PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569/A 569M; or structural quality, complying with ASTM A 570/A 570M, Grade 30, unless another grade is required by design loads.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

G. Steel Bars for Grating Treads: ASTM A 36/A 36M.

2.2 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Structural Design: Provide complete calculations for stair assemblies complying with New York State Building Code. and loads specified in 1.6 A & B.
      a. Stair Capacity: Uniform live load of 100 lb/sq ft (4.7 kPa) and a concentrated load of 300 lb (14.4 kg) with deflection of stringer or landing framing not to exceed 1/360 of span.
      b. Railing Assemblies: Comply with ASTM E985.
   4. At exit stairwells, provide unit stair towers designed for stacking to height of building as a self-supporting structure.
   5. Dimensions: As indicated on drawings.
   6. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   7. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   8. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
   1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
      a. Welded Joints: Continuously welded and ground smooth and flush.
      b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c. Exposed Edges and Corners: Eased to small uniform radius.
      d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality paint finish as indicated.

C. Fasteners General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
   1. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
   2. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
   3. Machine Screws: ASME B18.6.3.
   4. Lag Bolts: ASME B18.2.1.
   5. Plain Washers: Round, carbon steel, ASME B18.22.1.
   6. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
   7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in 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.

a. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.3 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
2. Tread Pan Material: Steel sheet.
3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch (1.9 mm) minimum.
4. Concrete Reinforcement: Welded wire mesh.
5. Concrete Finish: For resilient floor covering.

D. Risers: Same material and thickness as tread pans.
1. Nosing Depth: Not more than As shown on drawings overhang.
2. Nosing Return: Flush with top of concrete fill, not more than As shown on drawings wide.

E. Stringers: Rolled steel channels.
1. Stringer Depth: Minimum 12 inches (305 mm).
2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

G. Railings: Refer to Section 05 5213.

H. Posts, Guard and Intermediate Railings: Refer to Section 05 5213.

I. Infill Mesh: Refer to Section 05 5213.

J. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.4 HANDRAILS AND GUARDS

A. Refer to Section 05 5213

2.5 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.

B. Ungalvanized Steel Sheet: Cold-rolled only.
1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

C. Concrete Fill and Reinforcing Material: Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 4,000 psi, unless higher strengths are indicated.

D. Concrete Reinforcement: Mesh type, unfinished ASTM A 185, 2 by 2 inches--W1.4 by W1.4, unless otherwise indicated

2.6 ACCESSORIES

A. Factory Fabricated Stair Tread and Nosing:
1. Materials: Resilient Flooring.
a. Refer to Section 09 6500 - Resilient Flooring

B. Grout: Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

F. Grout: Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.7 FABRICATION, GENERAL

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated or required by code.
   1. Commercial class, unless otherwise indicated.

B. Shop Assembly: Preassemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Provide miscellaneous metal framing, clips, brackets, bearing plates, and other components necessary to support and anchor stairs treads and platforms on supporting structure.
   1. Join components by welding.

D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

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

F. Ease exposed edges to a minimum radius of approximately 1/32 inch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

G. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously, unless otherwise indicated.
   5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

H. Join components by welding

I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.8 SHOP FINISHING

A. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.

2. Number of Coats: One.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for self supporting stair.

C. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

E. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

F. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

G. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

H. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction

I. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

J. Obtain approval prior to site cutting or creating adjustments not scheduled.

K. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 INSTALLING STEEL RAILINGS AND HANDRAILS

A. Comply with applicable requirements in Division 5 Section "Pipe and Tube Railings" for railings, and as follows:

B. Adjust handrails and railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts to steel by welding directly to steel supporting members or set in concrete.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post installed anchors and bolts.
3. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:

a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
b. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
c. For hollow masonry anchorage, use bolts set in screen tubes filled with epoxy.
d. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

C. Wire Mesh Railing Insert Panels: Attach wire mesh railing insert panels to railing system by welding as indicated on Drawings

3.5 FIELD QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where work is being fabricated or produced to perform tests and inspections

B. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.

C. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts", testing at least 25 percent of bolts at any given connection. If any bolt fails, test all bolts at that connection. Provide follow up reports.

D. Welded Connections: Visually inspect all field-welded connections and test at least 25 percent of welds using the following:
1. Ultrasonic testing performed in accordance with ASTM E164.
2. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
3. Magnetic particle inspection performed in accordance with ASTM E709.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
a. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1

3.6 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

3.7 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

END OF SECTION

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Metal stairs, posts, wall, free standing, and railings.

B. Free-standing railings at steps.

C. Wire mesh infill panels for railings, guardrails and stairs.

D. Retainer channels as required to accept wire mesh infill panels.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 04 2000 - Unit Masonry: Placement of anchors in masonry.

C. Section 05 5100 - Metal Stairs

D. Section 09 9123 - Interior Painting: Paint finish.

1.4 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013, with Editorial Revision.

G. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

I. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for all railings and handrails specified in this Section to be fabricated and installed by the same firm.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in 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 metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.

C. Fabricator Qualifications: A firm, with a minimum of five (5) years experience in producing metal stairs & railings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

E. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.2 Structural Welding Code – Aluminum.

1.6 PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:
   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
      a. Concentrated load of 200 lbf applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.
   2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
      a. Concentrated load of 200 lbf applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. applied in any direction.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.
   3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
      a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.
   4.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
   1. Include the design engineer's seal and signature on each sheet of shop drawings.

C. Show all retainer channels and connections for wire mesh infill panels.

D. Samples: Submit two, 12 inch (300 mm) long samples of finish handrail for each type. Submit two samples of elbow, tee, wall bracket, and end stop.

E. Designer's Qualification Statement.

F. Fabricator's Qualification Statement.

G. Retainer channels.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements: Provide railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.

B. Handrails: Comply with applicable accessibility requirements of ADA Standards.

C. Structural Design: Provide complete railing assemblies complying with New York State Code.
   1. Railing Assemblies: Comply with ASTM E985.

D. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in New York, or personnel under direct supervision of such an engineer.

E. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

F. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience. Arrange for railings in this section to be fabricated and installed by the same firm.

G. Fabricator Qualifications:
1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
3. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
4. AWS D1.1, "Structural Welding Code--Steel AWS D1.3, "Structural Welding Code--Sheet Steel

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. 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.

F. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

G. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
1. Outside Diameter: as indicated on drawings.
2. Finish: Stainless steel interior and exterior.

H. Dimensions: See drawings for configurations and heights.

I. Guards:
1. Dimensions: See drawings for configurations and heights.
2. Top Rails and Posts: as indicated on drawings.
3. End and Intermediate Posts: Same material and size as top rails.
   a. Horizontal Spacing: As indicated on drawings.
   b. Mounting: Welded to top surface of stringer.
   c. Finish: Plain for interior and stainless steel for exterior

J. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.

2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
3. For anchorage to stud walls, provide backing plates, for bolting anchors.

K. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.2 STEEL RAILING MATERIAL

A. **All components of interior railings, post, mesh etc. shall be painted steel except wall and stair hand railings**.

B. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.

C. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

D. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

E. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

F. Straight Splice Connectors: Steel welding collars.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Finish: All components shall be steel painted except for wall and stair hand railings which shall be stainless.

2.3 STAINLESS STEEL MATERIAL

A. **All components of exterior railing. post, mesh etc. shall be stainless steel**.

B. All stainless steel shall be as follows:
1. Tubing: ASTM A 554, Grade MT 316L.
2. Handrails Pipe: ASTM A 312/A 312M, Grade TP 316L.
3. Plate and Sheet: ASTM A 666, Type 316L.
4. Expanded Metal: ASTM F 1267, Type II (expanded and flattened), made from stainless-steel sheet complying with ASTM A 666, Type 316.

2.4 BRACKETS, CONECTORS AND MISCELLANEOUS ITEMS

A. Wall Brackets: Provide wall brackets as follows:
1. Universal Weld Bracket Model 3393 as manufactured by Wagner Company.
a. Steel painted for interior and stainless steel for exterior hand rails.

B. Expansion Connector: as manufactured by Wagner Company.
1. Steel painted for interior and stainless steel for exterior.

C. Wall Returns: Wagner steel wall return with two (2) holes.
1. Stainless steel with stainless steel railings.

D. Base Flanges: Wagner heavy flush base flanges.
1. Stainless steel with stainless steel hand railings.

2.5 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 painting Sections.
1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

2.6 FABRICATION

A. Provide complete assemblies including handrails, railings, clips, brackets other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding, unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces

B. Shop Assembly: Pre-assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

C. Accurately form components to suit specific project conditions and for proper connection to building structure.

D. Fit and shop assemble components in largest practical sizes for delivery to site.

E. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

F. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work

G. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

H. Close exposed ends of railing members with prefabricated end fittings.

I. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work
   1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
   2. Connect railing posts to stair framing by direct welding.
   3. For ungalvanized handrails and railings, provide ungalvanized ferrous metal fittings, brackets, fasteners and sleeves.
   4. For all exterior applications and use stainless steel or aluminum anchors, including anchors embedded in exterior masonry and concrete construction.

K. Fasteners: Provide hex set screws for all fasteners.

L. Toe Boards: Provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated and if not indicated a minimum of 6” high..

M. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

N. **INFILL MESH**
   1. Infill at Mesh Railings: Woven wire mesh panels.
      a. Wire Size: 0.192-inch- diameter, lock-crimp steel wire woven inserted through frame holes and welded into frame.
      b. Wire Spacing: 2" x 2" x 1/8" inch (50 x 50 mm).

c. Retainer Channel: ½" x ½" steel channel to accept welded wire mesh
   a) Mounting: Mesh welded to retainers.
d. Finish: Steel painted for interior and stainless steel for exterior

2.7 STEEL AND IRON FINISHES

A. For ungalvanized steel railings, provide ungalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:
   1. Interior Railings (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."

C. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

D. For finish painting refer to Section 09 9123 - Interior Painting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure.

D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Fire retardant treated wood materials.

B. Communications and electrical room mounting boards.

C. Concealed wood blocking, nailers, and supports toilet accessories, casework, and hardware.

D. Miscellaneous wood nailers, furring, and grounds.

1.3 RELATED REQUIREMENTS

A. Section 06 1010 - Roof Related Rough Carpentry.

B. Section 10 2800 - Toilet And Bath Accessories.

C. Section 12 2940 - Roller Shades.

D. Section 12 3200 - Plastic Laminated Casework.

E. Section 12348 - Wood Laboratory Casework

1.4 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.

C. ICC (IBC) - International Building Code; 2018.

D. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

E. PS 20 - American Softwood Lumber Standard; 2015.

F. WWPA G-5 - Western Lumber Grading Rules; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on lumber, plywood, fasteners, and application instructions .

C. Shop drawings, or 2 foot long on-site samples which show the size, shape, configuration and method of fastening for all wood blocking assemblies, and which show how the blocking assemblies will relate to other adjoining work.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

E. Material Safety Data Sheets

1.6 QUALITY ASSURANCE

A. A firm (Installer) with not less than 5 continuous years experience performing carpentry work comparable to that required for this project, employing personnel skilled in the work specified.

B. The Installer shall directly employ the personnel performing the work of this section.

C. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
2. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.

3. Pre-Work Conference: Attend the pre-roofing meeting to discuss how carpentry work will be performed and coordinated with other work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Deliver and store materials dry at all times.

C. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a two (2) year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
1. Wood, including shims, nailers, blocking, furring and similar members, in the sizes indicated, worked into the shapes shown.
2. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
3. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.
4. Pre-Work Conference: Attend the pre-roofing meeting to discuss how carpentry work will be performed and coordinated with other work.
5. Species: Douglas Fir, unless otherwise indicated, construction grade solid lumber free of splits, large knots and other imperfections.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER

A. Grading Agency: Western Wood Products Association; WWPA G-5.

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.

2.3 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.4 ACCESSORIES

A. Fasteners and Anchors:
1. General: Provide fasteners of size and type that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification
2. Metal and Finish: Hot-dipped galvanized steel as per ASTM A153/A153M for exterior, wet areas, wood presevative, and high humidity areas and unfinished steel for other wood locations.
3. Use screws wherever possible, minimum size diameter #12. If nails are used they shall be annular ring shank type. Do not use dry wall screws to secure wood blocking assemblies.
4. Anchors: Toggle bolt type for anchorage to hollow masonry.

2.5 FACTORY WOOD TREATMENT

A. Fire Retardant Treatment:
   1. Manufacturers:
      a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
      b. Koppers, Inc: www.koppers.com.
      c. Substitutions: 01 2500 - Substitution Procedures
   2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items all interior concealed blocking.
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Coordinate carpentry work with the installation of other related work.

D. Shim and set carpentry work plumb and true.

E. Stagger joints in built up assemblies at least 2 feet to obtain maximum strength. Provide the appropriate shapes needed and adjust wood members to suit existing conditions for full bearing and secure attachment. Discard defective material, and pieces which are too small, and fabricate the work with a minimum of joints and an optimum joint arrangement.

F. Securely attach carpentry work by fastening it using recognized standards, to resist a pull of 275 pounds per lineal foot in any direction. Countersink all fasteners flush unless otherwise shown.

G. Space fasteners to achieve adequate holding power, generally as follows:
   1. Anchor bolts embedded in concrete, drilled anchors into concrete or masonry, screws into a steel deck or structural steel member, or screws into wood framing: 12 inches on center.
   2. Nails into wood: 8 inches on center.
   3. Install two rows of fasteners on blocking wider than 5 inches.

H. Fit carpentry work neatly scribed and cut to fit within 1/8 inch of adjoining materials. Position furring, nailers, blocking, shims and similar supports for the proper attachment of subsequent work.

I. Fasten wood blocking to underlying steel members at gypsum deck areas, with self tapping screws. Pre-drill holes in the steel members or utilize self drilling/tapping screws.

3.3 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

C. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Towel and bath accessories.
3. Wall-mounted door stops.
4. Visual display boards

3.4 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated or required as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

3.5 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.6 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.7 CLEANING AND PROTECTION

A. General: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

ROOF RELATED ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules, keynotes, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Related wood nailers, blocking, shims, and plywood.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 04 7200 - Cast Stone Masonry.

C. Section 07 4113 - Metal Roofing

D. Section 07 5323 - EPDM Roofing

F. Section 07 6200 - Sheet Metal Flashing and Specialties

G. Section 07 7200 - Roof Accessories.

H. Section 09 2662 - Gypsum Sheathing.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with at least 5 continuous years experience performing carpentry work comparable to that required for this project, employing personnel skilled in the work specified.
2. The Installer shall directly employ the personnel performing the work of this section.
3. The Installer shall have a full time supervisor on the roof when work is in progress. The Supervisor shall have a minimum of 5 years experience in work similar in nature and scope to this project, and speak fluent English.

B. Pre-Construction Conference: Attend the pre-construction meeting to discuss how and when carpentry work will be performed and coordinated with other work, and how the building will be kept watertight as work occurs.

1.5 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work on site:

1. A pre-work site and building inspection report with photos, to document conditions before work starts.
2. Mill or Manufacturer data sheets to identify the source for each type of lumber and fastener.
   a. Do not submit trade association literature.
3. 2 foot long on-site samples which show the size, shape, configuration and method of fastening for all wood blocking assemblies, and which show how the blocking assemblies will relate to other adjoining work.
4. Simultaneously provide all technical data submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.
   a. Submittals shall be prepared and made by the firm that will perform the actual work.
   b. Provide electronic submittals in pdf format on USB Drives, organized in folders by Section.

B. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building to the Construction Manager.

C. Payment requisitions will not be processed until all submittals are received and approved.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store material, and keep it dry at all times. Cover lumber with tarps and protect against exposure to weather and contact with damp or wet surfaces.

B. Support stacked products to prevent deformation and to allow air circulation.

C. Do not overload the structure when storing material on the roof.

D. Protect all roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.7 GUARANTEE

A. Provide a Contractor's written Guarantee which warrants that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: leakage, delamination, lifting, loosening, splitting, cracking, warping and undue expansion.
2. The Guarantee shall provide that the Contractor will make the repairs and modifications necessary to enable the work to perform as warranted at his own expense.
3. Guarantee coverage shall include removing and replacing items or materials installed as part of the original work, if removal is needed to affect guaranteed repairs.

B. The Contractor's Guarantee shall be issued no more than 30 days before the satisfactory completion of all punch list work.

C. The Contractor’s Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor’s Guarantee.

D. Refer to Section 01 7800 - Closeout Submittals for additional requirements.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wood, including shims, nailers, blocking, furring and similar members, in the sizes indicated, worked into the shapes shown, and as follows:

1. Lumber: Douglas Fir dimension lumber, free of large knots and other imperfections.
2. Plywood: Exterior grade APA rated Type CDX underlayment plywood.
3. Beveled Siding: Utility grade cedar, redwood, or synthetic siding, 1/2 inch by 6 inches and 3/4 inch by 10 inches wide, tapered to 1/8 inch thick.
4. Fascia Boards: 5/4 inch clear white pine where painted. Douglas Fir dimension lumber where covered with metal or other materials

B. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
2. Material Quality: Obtain each type of material from a single source to ensure consistent quality, color, pattern, and texture.

D. Metal framing, including light gage metal channels and studs shall be factory formed of minimum 24 gauge cold formed galvanized steel.

1. Refer to Section 05 4000 - Cold-Formed Metal Framing for additional information.

2.2 FASTENERS

A. Hot dipped galvanized steel, stainless steel, or steel covered with a proprietary rust inhibiting coating.

B. Use screws wherever possible, minimum size diameter #12. If nails are used they shall be annular ring shank type. Do not use dry wall screws to secure wood blocking assemblies.

C. Use stainless steel threaded epoxy set adhesive anchors for fastening wood blocking to solid masonry, Hilti "HIT-HY 150" or equal.

2.3 ACCESSORIES

A. Batt Insulation: un-faced Rockwool insulation, minimum thickness 6 inches, and as needed to fill the expansion joints.

B. Polyethylene: 6 mil thick fire retardant polyethylene sheeting.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Coordinate carpentry work with the installation of the roofing system, insulation, flashings, and other similar items.

B. Shim and set carpentry work plumb and true, except provide slope at the top surfaces of horizontal members as indicated.

C. Stagger joints in built up assemblies at least 2 feet to obtain maximum strength. Provide the appropriate shapes needed and adjust wood members to suit existing conditions for full bearing and secure attachment. Discard defective material, and pieces which are too small, and fabricate the work with a minimum of joints and an optimum joint arrangement.

D. Securely attach carpentry work to resist a pull of 275 pounds per lineal foot in any direction. Countersink all fasteners flush unless otherwise shown.

E. Space fasteners to achieve adequate holding power, generally as follows:
   1. Anchor bolts embedded in concrete, drilled anchors into concrete or masonry, screws into a steel deck or structural steel member, or screws into wood framing: 12 inches on center.
   2. Nails into wood: 8 inches on center.
   3. Install two rows of fasteners on blocking wider than 5 inches.

F. Fit carpentry work neatly scribed and cut to fit within 1/8 inch of adjoining materials. Position furring, nailers, blocking, shims and similar supports for the proper attachment of subsequent work.

G. Fasten wood blocking assemblies to metal decks with #12 screws. Pre-drill holes as needed. .

3.2 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage, prior to performing any work.

B. The Construction Manager will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leaks or damage which was not documented in the Contractor’s report, or repaired to the Owners satisfaction at the Contractor’s expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

3.3 WASTE DISPOSAL

A. Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.

1. Comply with all applicable Federal, State and Local regulations.
2. Do not burn anything, including wood scrap on site.

END OF SECTION

FINISH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

C. Hardware and attachment accessories.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

C. Section 08 1416 - Flush Wood Doors.

D. Section 09 9123 - Interior Painting: Painting of finish carpentry items.

1.4 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and carpentry/ cabinets.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
3. Include certification program label.

D. Samples: Submit two samples of wood trim 12 inch (- mm) long.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification:

1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

2.2 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000 - Product Requirements.

2.3 SHEET MATERIALS

A. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.4 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Concealed Joint Fasteners: Threaded steel.

2.5 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.6 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Stain: As selected by Fuller and D'Angelo P.C..
      c. Sheen: Flat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

3.3 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9123.

3.4 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.6 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Bituminous dampproofing
   1. Exterior, below-grade surfaces of concrete foundation walls and structures. (No heated or open space on inside of wall).
   2. Back side of concrete retaining walls, below grade.
   3. Exterior face of inner wythe of exterior masonry cavity walls except where fluid air barrier is being installed.
   4. Interior face of exterior concrete and masonry walls, above grade.
   5. Exterior columns, beams, lintels , and hangers not receiving concealed flashings or embedded in concrete.
   6. Protection boards.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 07 1300 - Sheet Waterproofing.

C. Section 07 2100 - Thermal Insulation

D. Section 31 2301 - Excavation, Backfill and Compaction.

1.4 REFERENCE STANDARDS

A. ASTM D449/D449M - Standard Specification for Asphalt Used in Dampproofing and Waterproofing; 2003 (Reapproved 2014).

B. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).

C. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.

D. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

D. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs)

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of this section with at least five (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

B. Substrate: Proceed with dampproofing only after substrate construction and penetrating work have been completed

C. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured

PART 2 PRODUCTS

2.1 GENERAL

A. Odor Elimination: For interior and concealed-in-wall uses, provide type of bituminous dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.

B. Asbestos Free: All material shall be asbestos free.

C. Other Acceptable Bituminous Dampproofing Manufacturers:

2.2 BITUMINOUS DAMPPROOFING

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.

1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
3. VOC Content: Not more than permitted by local, State, and federal regulations.
4. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film.
5. Products:
   a. W. R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade): www.wrmeadows.com/#sle.
   b. Substitutions: Section 01 2500 Substitution Procedures.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.3 ACCESSORIES

A. Protection Board: 1/8 inch (3 mm) thick biodegradable hardboard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.3 APPLICATION

A. Foundation Walls: Apply two coats of asphalt dampproofing.

B. Patch disturbed areas of existing dampproofing with two coats of new dampproofing of the same generic type.

C. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

D. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.

E. Apply bitumen with roller.

F. Apply bitumen at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F (14 degrees C); do not exceed finish blowing temperature for four hours.

G. Apply from 2 inches (50 mm) below finish grade elevation down to top of footings.

H. Seal items watertight with mastic, that project through dampproofing surface.

I. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.

J. Scribe and cut boards around projections, penetrations, and interruptions.

K. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat required for embedding fabric is in addition to other coats required

L. On Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft.

M. On Backs of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..

N. On Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft.

1. Lap dampproofing at least 1/4 inch (6 mm) onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
2. Do not apply dampproofing where fluid spray barrier is required.

O. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe, and lap dampproofing at least 1/4 inch (6 mm) onto shelf angles supporting veneer

P. On Interior Face of Single-Wythe Exterior Masonry Walls: Where above grade and indicated to be furred and finished, apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft.

Q. On exterior steel: Apply one brush or spray coat at not less than 1 gal./100 sq. ft.

END OF SECTION

SHEET WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Sheet Waterproofing:
   1. Self-adhesive membrane of not less than 60 mils thickness, consisting of preparation of existing and repaired concrete surfaces, sealing of cracks and joints, and application of sheet membrane waterproofing.

B. Waterstops.

C. Below-grade waterproofing accessories.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 2100 - Thermal Insulation: Insulation used for drainage board and protective cover.

C. Section 07 6200 - Sheet Metal Flashing and Trim: Metal parapet, coping, and counterflashing.

D. Section 07 9200 - Joint Sealants: Sealing moving joints in waterproofed surfaces that are not required to be treated in this section.

E. 33 4100 - Foundation Subdrainage System: for perimeter drainage system.

1.4 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

C. ASTM D 751 Test Method for Coated Fabrics

D. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2012.

E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2017.

F. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems; 2014.

G. ASTM D 3767 - Standard Practice for Rubber - Measurements of Dimensions

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

I. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a, with Editorial Revision (2013).

J. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

K. UL 790 Tests for Fire Resistance of Roof Covering Materials

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for membrane and joint and crack sealants.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

G. Schedule of inspections and inspections reports prepared by the manufacturer. Manufacturer's representative shall perform a minimum of three (3) inspections on the work in progress

1.6 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved in writing by the manufacture.

C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer

D. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).

E. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing

1. Manufacturer's representative shall be present at meeting.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
2. Protect mastic and adhesive from moisture and potential sources of ignition.
3. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.
4. Protect surface conditioner from freezing.

B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.8 MOCK-UP

A. Construct mock-up consisting of 100 sq ft (10 sq m) of horizontal waterproofed panel; to represent finished work including internal and external corners, seam jointing, drainage panel, and base flashings.

B. Mock-up may remain as part of this Work.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until liquid or mastic accessories have cured.

B. Coordinate waterproofing work with other trades. The applicator shall have sole right of access to the specified areas for the time needed to complete the installation.

C. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.

D. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post “NO SMOKING” signs.

E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Upon completion and acceptance of the work required by this section, the manufacturer will issue a warranty agreeing to promptly replace defective materials for a period of five (5) years.

1. Manufacturer and Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Port Chester-Rye UFSD.

PART 2 PRODUCTS

2.1 WATERPROOFING APPLICATIONS

A. Self Adheared Rubber Sheet Membrane:

1. Location: Foundation walls below grade..
2. Vertical Surfaces: Adhesive bonded to substrate.
3. Horizontal Surfaces: Adhesive bonded to substrate.
4. Cover with protection board.

2.2 MEMBRANE MATERIALS

A. Self-Adhered Rubber Sheet Membrane:

1. Thickness: 60 mil, 0.060 inch (1.5 mm), minimum.
   a. 56 mils of rubberized asphalt membrane laminated to a 4 mil cross-laminated polyethylene film.
2. Sheet Width: 36 inch (0.914 m), minimum.
3. Tensile Strength:
   a. Film: 5000 pounds per square inch (34.57 MPa), minimum, measured according to ASTM D882 and at grip-separation rate of 2 inches (50 mm) per minute.
   b. Membrane: 325 pounds per square inch (2.24 MPa), minimum, measured according to ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches (50 mm) per minute.
4. Elongation at Break: 350 percent, minimum, measured according to ASTM D412.
5. Water Vapor Permeance: 0.05 perm (2.9 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
6. Low Temperature Flexibility: Unaffected when tested according to ASTM D1970 at -45degrees F (- mm) , 180 degree bend on 1 inch (25 mm) mandrel.
7. Crack Cycling at -25°F (100 cycles): Unaffected, ASTM C 836
8. Peel Strength: 10 pounds per inch (1750 N/m), minimum, when tested according to ASTM D903.
9. Lap Adhesion Strength: 19 pounds per inch (3327 N/m), minimum, when tested according to ASTM D1876.
10. Puncture Resistance: 60 pounds (27 kg), minimum, measured in accordance with ASTM E154/E154M.
11. Soil Burial 16 weeks: No Effect, GSA-PBS 07121
12. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
13. Hydrostatic Resistance: Resists the weight of 230 feet when tested according to ASTM D5385.

B. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

C. Manufacturers:

1. Carlisle Coatings & Waterproofing Incorporated; MiraDRI 860/861; www.carlisle-ccw.com.
2. Substitutions: See Section 01 2500 Substitution Procedures. .

2.3 ACCESSORIES

A. Primer: As recommended by membrane manufacturer.

B. Mastic: As recommended by membrane manufacturer..

C. Seaming Materials: As recommended by membrane manufacturer.

D. Membrane Sealant: As recommended by membrane manufacturer.

E. Backer Rod: Shall be closed-cell polyethylene foam rod.

F. Termination Bars: Aluminum; compatible with membrane and adhesives.

G. Surface Conditioner: Type, compatible with membrane and recommended by manufacturer for substrate.

H. Adhesives: As recommended by membrane manufacturer.

I. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

J. Protection/Drainage Board: Rigid insulation specified in Section 07 2100.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

D. Condition of Concrete Surfaces:

1. The concrete surfaces shall be of sound structural grade and shall have a smooth finish, free of fins, ridges, protrusions, rough spalled areas, loose aggregate, exposed course aggregate, voids or entrained air holes. Rough surfaces shall receive a well-adhered parget coat.
2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type and be approved by the Carlisle representative.
3. Concrete shall be cured at least 7 days and shall be sloped for proper drainage.
4. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
5. Surfaces at cold joints shall be on the same plane

3.2 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Cast-In-Place Concrete Substrates:

1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type or clear resin-based materials without waxes, oils or pigments and be approved by the manufacturer's representative.
3. Form release agents must not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane.
4. Concrete/Footing shall be sloped for proper drainage.
5. Surfaces at cold joints shall be on the same plane. Grind irregular construction joints to suitable flush surface.

E. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

F. Seal cracks and joints with sealant using depth to width ratio as recommended by sealant manufacturer.
   1. All cracks over 1/16" in width and all moving cracks under 1/16" in width shall be routed out to 1/4" minimum in width and depth and filled flush with an approved polyurethane sealant recommended by manufacturer.
   2. Install a 3/4" face, 45 degree cant of polyurethane sealant at all angle changes and inside corners including penetrations through the deck, walls, curbs, etc.
   3. All expansion joints less than 1" wide shall be cleaned, primed, fitted with a backing rod and caulked with polyurethane sealant. For larger joints, contact manufacturer's representative.
   4. Allow all sealant to cure at least overnight.

G. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

H. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.
   1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
   2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
   3. Remove and replace areas of defective concrete as specified in Section 03 3000.
   4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
   5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.3 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

B. Roll out membrane, and minimize wrinkles and bubbles.

C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.

D. Overlap edges and ends, minimum 3 inches (76 mm), seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.

G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

H. Seal membrane and flashings to adjoining surfaces.

I. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

J. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

K. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

3.4 INSTALLATION - DRAINAGE PANEL

A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

D. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 3 inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

3.5 FIELD QUALITY CONTROL

A. Port Chester-Rye UFSD will provide testing services in accordance with Section 01 4000 - Quality Requirements. Contractor shall provide temporary construction and materials for testing.

B. Flood to minimum depth of 2 inch (50 mm) with clean water, and after 48 hours inspect for leaks.

C. If leaking is found, remove water, repair leaking areas with new waterproofing materials as directed by Fuller and D'Angelo P.C.; repeat flood test, and repair damage to building.

3.6 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

B. Vertical Application:

1. Install perimeter drainage System as the first course of drainage composite immediately after membrane has been installed on vertical surfaces. Install protection board Stop drainage board 6" below final grade level.

END OF SECTION

THERMAL INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Board insulation at perimeter foundation wall, underside of floor slabs, and over waterproofing.

B. Batt insulation in exterior wall construction.

C. High Performance insulation in mansard roof.

D. Batt insulation for interior partitions.

E. Foam sealant for filling exterior perimeter windows, curtain walls, storefronts, doors and trim spaces.

F. Concealed building insulation.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 04 2000 - Unit Masonry. for cavity wall insulation.

C. Section 05 4000 - Cold-Formed Metal Framing: Batt insulation within metal framing and vapor barrier..

D. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.

E. Section 07 1113 - Bituminous Dampproofing.

F. Section 07 1300 - Sheet Waterproofing

G. Section 07 2500 - Weather Barriers: Separate sheet and liquid air barrier and vapor retarder materials.

H. Section 07 4113 - Metal Roof Panels: Insulation specified as part of roofing system.

I. Section 07 5323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM): Insulation specified as part of roofing system.

J. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

K. Section 09 2116 - Gypsum Board Assemblies.

L. Section 09 5100 - Acoustical Ceilings.

M. Section: 09 8430 - Sound-Absorbing Wall and Ceiling Units

N. Section 12 3200 - Plastic Laminated Casework: Reflective barrier installed on casework.

1.4 REFERENCE STANDARDS

A. ASTM C 203- Breaking Load and Flexural Properties of Block-Type Thermal Insulation ASTM C 203

B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.

C. ASTM C272 Water Absorption

D. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission

E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2017a.

F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

G. ASTM D 696 Coefficient of Linear Thermal Expansion.

H. ASTM D1621 Compressive Strength.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

J. ASTM E 119 Fire-Resistance Ratings

K. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

L. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.

M. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.8 WARRANTY

A. Provide manufacturer's written that the actual thermal resistance of the extruded polystyrene insulation will not vary by more than ten (10%) from its published thermal resistance.

1. Warranty Period: 5 years.

PART 2 PRODUCTS

2.1 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.

1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
2. Smoke Developed:165 or less, when tested in accordance with ASTM E84.
3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
4. R-value (RSI-value); 1 inch (25 mm) of material at 72 degrees F (22 C): 5 (0.88), minimum.
5. Board Size: 24 x 96 inch (610 x 2440 mm).
6. Board Thickness: 1-1/2 inches (37.5 mm).
7. Board Edges: Square.
8. Thermal Resistance: per inch, ASTM C518 @ 75°F R-value 5.0
9. Compressive Resistance: ____ psi (30 kPa).
10. Product: Dow Chemical Co. "Styrofoam".

a. "Styrofoam Perimate". Use for vertical foundation walls over membrane waterproofing.
b. "Styrofoam HighLoad 40" . Use for under slabs
c. "Styrofoam Square Edge" Use for vertical foundation walls, except over membrane water proofing.

2.2 FIBERBOARD INSULATION MATERIALS

A. Glass Fiberboard Insulation: Rigid glass fiber, in accordance with ASTM C612.
1. Facing: None, unfaced.
2. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
3. Smoke Developed Index: 50 or less, when tested with facing, if any, in accordance with ASTM E84.
4. Board Size: 24 by 48 inch (600 by 1200 mm).
5. Board Thickness: 1" and 1-1/2 inches (25 and 37.5 mm) as shown on drawings.
6. Board Edges: Square.
7. Thermal Conductivity (k-factor): BTU inch/hr sq ft F (W/m K) of 0.26 (0.037) per inch at 75 degrees F (24 degrees C) when tested in accordance with ASTM C518.
8. Maximum Density: 3 lb/cu ft (1.35 kg/cu m). ASTM C303
9. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
10. Smoke Developed Index: 50, when tested in accordance with ASTM E84.
11. Manufacturers:
a. Owens Corning Corp: "Fiberglas 703 Series", www.owenscorning.com.
a) Locations: Shaft walls and furred walls.

2.3 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Formaldehyde Content: Zero.
5. Thermal Resistance: R-11 and R-19 walls.
6. Thickness: 3-1/2, 5-1/2 or 10 inch (87.5, 137.5 or 250 mm) as required to fill stud depth.
7. Facing: Unfaced.
8. Creased: Provide material 1" wider that standard stud spacing to bow into stud cavity.
9. Manufacturers:
a. Owens Corning Corp: "FiberGlas" thermal batt insulation www.owenscorning.com.
a) Locations: All exterior partitions
10. Substitutions: Section 01 2500 Substitution Procedures.

B. High Performance Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Formaldehyde Content: Zero.
5. Thermal Resistance: R-38
6. Thickness: 10-1/4 inch (253.3 mm).
7. Facing: Aluminum foil, one side.
8. Manufacturers:

a. CertainTeed Corporation: www.certainteed.com.

9. Substitutions: Section 01 2500 Substitution Procedures.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.

1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
2. Thermal Resistance: R of 3.7 per inch of thickness (25 mm).
3. Thickness: 3-1/2 or 5-1/2 inch (70 or 137.5 mm)es as required to fill stud cavity.
4. Manufacturers:
   a. "Thermafiber SAFB" Thermafiber, Inc: www.thermafiber.com.
      a) Locations: All interior partitions.
5. Substitutions: Section 01 2500 Substitution Procedures.

2.4 REFLECTIVE INSULATION

A. Where base cabinets are located on exterior walls and in front of fin tube radiation, provide double foil bubble, foil both sides, Class A fire rating exterior wall and back of cabinet.

1. Double foil bubble, two outer layers of aluminum foil bonded to a layer of polyethylene.
2. R value: 4.2

B. Manufacturer: Reflectix, Inc., (765) 533-4332; customerservice@reflectixinc.com

2.5 ACOUSTICAL INSULATION

A. Where designated on drawings and/or specifications the following acoustical insulations shall apply:

1. Acoustical Insulation Type 1: Ridged glass fiber 10 lbs/cf. density or neoprene sponge rubber
   a. Mason Industries, “AFG-10”.

2.6 ACCESSORIES

A. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil, 0.010 inch (0.25 mm) thick.

B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch (50 mm) wide.

C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

D. Wire or Wire Mesh: Galvanized steel, hexagonal wire mesh. Gauges as required to support insulation.

E. Adhesive: Type recommended by insulation manufacturer for application.

F. Window and Door Joint Seal: Polyurethane-based joint filler:

1. UL Classified.
2. Product: "Great Stuff" as manufactured by Dow Chemical.
   a. "Gaps and Cracks: for joints less than 1".
   b. "Big Gap Filler" for joint over 1".
3. Use for all joints around windows and doors located on exterior walls.

G. Sill Sealer: Owens Corning "FoamSealer,

1. Width: As required to provide total coverage under 6" metal stud track.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of irregularities.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Preparation:
   1. Surface shall be smooth, monolithic and free of coarse aggregate.
   2. Clean off debris from footings.
   3. Waterproofing shall be cured and free of solvent.

B. Adhere a 6 inch (150 mm) wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints.
   2. Extend sheet full height of joint.

C. Apply adhesive to back of boards:
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch (3 mm) thick.

D. Install boards vertically on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Be sure shiplap on long edge of panel overlaps previous panel. Continue until a comer is reached.
      a. Cut and install comer panels, cutting off shiplap at corner.
   3. When additional tiers are required, shiplap edges at both horizontal and vertical joints
   4. Seal off top edge of panels below grade to prevent soil entry, using a J or Z channel, sheathing tape, or soil fabric.
      a. Protect exposed panels above grade from physical damage and ultraviolet exposure with protection panel, flashing, or latex coating
   5. Butt edges and ends tightly to adjacent boards and to protrusions.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BOARD INSTALLATION AT EXTERIOR WALLS

A. Adhere a 6 inch (150 mm) wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints between sheets.

B. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

C. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Extend boards over expansion joints, unbonded to wall on one side of joint.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.4 BOARD INSTALLATION AT CAVITY WALLS

A. Install boards to fit snugly between wall ties.

B. Install boards horizontally on walls.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

D. Place 6 inch (150 mm) wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

3.5 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.6 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane between framing members.

F. Tape insulation batts in place.

G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

I. Tape seal tears or cuts in vapor retarder.

J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

K. Coordinate work of this section with requirements for vapor retarder specified in Section 07 2500.

3.7 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:

1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
2. Notify in ABAA writing of schedule for air barrier work, and allow adequate time for testing and inspection.
3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.

3.8 ACOUSTICAL INSULATION

A. Acoustical Insulation shall be installed as follows:

1. Partitions requiring sound attenuation batts.
2. Friction fit snug against wallboard without gaps between batts. Butt ends of batts together. Install behind electrical outlets, structural obstructions, jambs, sills etc.

3.9 REFLECTIVE INSULATION

A. Adhere to cabinets with adhesive recommended by the manufacturer.

3.10 FOAM WINDOW AND DOOR SEAL

A. Fill all exterior joint between windows and doors solid in accordance with manufacture's instructions.

B. Cut back to permit application of joint sealant.

3.11 SILL SEALER

A. Smooth top surface of of wall to provide maximum variation of 1/4".

B. Butt ends and perpendicular joints tightly.

C. Pierce sill sealer thru anchor bolts or reinforcing rods.

D. Anchor sill plate to wall.

3.12 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

WEATHER BARRIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Air Barrier Sheet, Mechanically Fastened.

B. Air Barrier Sheet, Fluid-applied.

C. Air Barriers: Materials that form a system to stop passage of air through exterior walls and joints around frames of openings in exterior walls.

D. Self Adhering flashing.

E. Fluid applied flashing.

F. Through wall flashing.

G. Joint Tape.

H. Joint Compound.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.

B. Section 04 2000 - Unit Masonry

C. Section 05 4000 - Cold-Formed Metal Framing: Water-resistive barrier under exterior cladding.

D. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.

E. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.

F. Section 07 5300 - Elastomeric Membrane Roofing: Vapor retarder installed as part of roofing system.

G. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

H. Section 07 9200 - Joint Sealants: Sealing building expansion joints.

I. Section 09 2116 - Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

J. Section 09 2662 - Gypsum Sheathing

1.4 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.

1. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.5 REFERENCE STANDARDS

A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2014.

B. ASTM C 1250 - Standard Test Method for Nonvolatile Content of Cold Liquid-Applied Elastomeric Waterproofing Membranes

C. ASTM C 1305 - Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane

D. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

E. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting

F. ASTM D 2240 - Standard Test Method for Rubber Property - Durometer Hardness.

G. ASTM D 4541 - Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

J. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen.

K. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylight, Doors and Curtain Walls by Uniform Static Air Pressure Differences.

L. ASTM E 779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.

M. ASTM E 783 - Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors.

N. ASTM E 1105 - Standard 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.
   1. ASTM E 1186 - Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

O. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls

P. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

Q. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

R. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

S. AATCC Test Method 127 Water Resistance: Hydrostatic Pressure Test.

T. TAPPI Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area).

U. TAPPI Test Method T-460; Air Resistance (Gurley Hill Method)

1.6 QUALITY ASSURANCES

A. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

B. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.

C. Qualifications
   1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
   2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
   3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer

1.7 PRE-INSTALATION MEETING

A. Refer to Section 01 3000 - Administrative Requirements.

B. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, Engineer, Consultant, Installer, Owner's Representative, and Weather Barrier Manufacturer's Designated Representative.

C. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch

D. Shop Drawings: Provide drawings of special joint conditions.

E. Manufacturer's Installation Instructions: Indicate preparation.

F. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier system installation

1.9 MOCK-UP

A. Install water-resistive barrier materials in mock-up specified in Section 01 4000.

B. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty

C. Install mock-up using approved weather barrier assembly including fasteners, flashing, and tape and related accessories per manufacturer's current printed instructions and recommendations.

1. Mock-up size: 10' X 10'.
2. Mock-up Substrate: Match wall assembly construction, including window opening.
3. Mock-up may remain as part of the work.

D. Contact manufacturer's designated representative prior to weather barrier system installation, to perform required mock-up visual inspection and analysis as required for warranty

1.10 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

1.11 DELIVERY, STORAGE AND HANDLING

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.12 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of doors, louvers , flashings, sheathing, and wall panel to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation

1.13 WARRANTY

A. Special Warranty

1. Special weather-barrier manufacturer's warranty for weather barrier assembly for a period of ten (10) years from date of final weather barrier installation.
2. Approval by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 PRODUCTS

2.1 WEATHER BARRIER ASSEMBLIES

A. Air Barrier:
   1. On outside surface of sheathing of exterior walls; use air barrier sheet, mechanically fastened type.

2.2 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Air Barrier Sheet, Mechanically Fastened:
   1. Air Permeance: 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 5 perms (286 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
   3. Air Penetration: 0.001 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2357
   4. Water Penetration Resistance: Withstand a water head of 21 inches (55 cm), minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
   5. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
   6. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
   7. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with sheet material; unless otherwise specified.
   8. Basis Weight: Minimum 2.7 oz/yd2, when tested in accordance with TAPPI Test Method T-410.
   9. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
   10. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
   11. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
   12. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10
   13. Manufacturers:
      a. DuPont Company; Tyvek CommercialWrap: www.dupont.com.
      b. Substitutions: See Section 01 2500 - Substitution Procedures

B. Air Barrier Liquid Moisture Barrier.
   1. Material:Liquid synthetic rubber
   2. Dry Film Thickness (DFT): 40 mils, 0.040 inch (1.016 mm), minimum.
   3. Water Vapor Permeance: 0.1 perms (57 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
   4. Water Penetration Resistance: Greater than 1000 cm when tested in accordance with AATCC Test Method 127. No leakage at 15 psf when tested in accordance with ASTM E 331
   5. Elongation: 700 percent, minimum, when tested in accordance with ASTM D412.
   6. Tensile Strength: Minimum 250 lbs/in2, when tested in accordance with ASTM D 412
   7. Low Temperature Crack Bridging: Pass, when tested in accordance with ASTM C 1305.
   8. Surface Burning Characteristics: Flame spread index of 25 or less, Class A smoke developed index of 25 or less, when tested in accordance with ASTM E84.
   9. VOC Content: 77 g/L .when measured in accordance with ASTM C 1250.
   10. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
   11. Manufacturers:
      a. W.R. Meadows, Inc; Air-Shield LSR: www.wrmeadows.com.
      b. Substitutions: Section 01 2500 Substitution Procedures.

2.3 SEALANTS

A. Polyurethane Sealant: as specified in Section 07 9200 - Joint Sealants.

B. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

2.4 ADHESIVES

A. Provide adhesive recommended by weather barrier manufacturer.

2.5 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Joint Treatment.
   1. Joint Tape:
      a. Seam Tape: 3 inch wide, DuPont™ Tyvek® Tape for commercial applications.

C. Flashings
   1. Vapor permeable fluid-applied elastomeric flashing:
      a. Product: DuPont™ Tyvek® Fluid Applied Flashing and Joint Compound as manufactured by DuPont™.
   2. Sheet flashing with butyl adhesive layer.
      a. Product: DuPont™ StraightFlash™.
   3. Primers for flexible flashing and sheet flashing:
      a. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
   4. Sealant: DuPont™ Sealant for Tyvek® Fluid Applied Systems.

D. Fasteners: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4" or 2" metal gasketed washer.

E. Sealants: Refer to Section 07900 Joint Sealants and approved by the weather barrier manufacturer

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

B. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive air barrier system in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Sheathing:
   1. Joints shall be prepared per manufacturer's approved joint treatment details.
   2. Apply joint tape as recommended by fluid-applied weather barrier manufacturer.
      a. No joint treatment required for joints up to 1/16 inch.

b. Joints 1/16 to 1/4 inch: Fluid-applied joint compound applied to form a 1 inch width on each side of sheathing joint; smooth joint compound across sheathing joint. Thickness shall be 15 to 25 mils.

c. Joints 1/16 to 1/2 inch: Apply joint tape to bridge both sides of joint equally. Apply fluid-applied joint compound and trowel smooth embedding joint compound uniformly into joint tape to form a 1 inch width on each side of sheathing joint at a consistent thickness of 15 to 25 mils.

d. Joints 1/2 to 1 inch: Apply sheet flashing primer above and below sheathing joint. Center sheet flashing over sheathing joint and press firmly in place per manufacturer's recommendations.

D. Non-movement joints in masonry and transitions to columns and beams:

1. Joints 1/4 inch wide or less: Apply fluid-applied joint compound a minimum of 2 inches wide by 60 mils thick to each side of joint or crack
2. Joints 1/4 to 1/2 inch: Apply joint tape to joint, then apply joint compound to joint 2 inches wide by 60 mils thick OR Apply primer 2 inches on each side of joint. Center sheet flashing over joint and press firmly in place per manufacturer's recommendations.

E. Apply fluid-applied joint compound to cladding anchors prior to installation of weather barrier membrane per manufacturer's instructions.

F. Apply fluid-applied joint compound around penetrations in exterior walls forming a fillet bead minimum ½ inch onto each surface.

G. Mechanically Fastened Sheets - On Exterior:

1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
2. Overlap seams as recommended by manufacturer but at least 6 inches.
3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches (305 mm).
4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches (305 to 460 mm) on center along each framing member supporting sheathing.
5. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
6. Where stud framing rests on concrete or masonry, extend lower edge of sheet at least 4 inches (100 mm) below bottom of framing and seal to foundation with sealant.
7. Install air barrier and vapor retarder UNDER jamb flashings.
8. Install head flashings under weather barrier.
9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

H. Liquid Applied Coatings Over Concrete Masonry Units.

1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
2. Patch all cracks, protrusions, small voids, offsets, details, irregularities and small deformities with manufacturer's recommended patching material. wait two (2) hours before application.
3. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
4. Use flashing to seal to adjacent construction and to bridge joints.
5. Provide Mock-up to insure proper thickness can be achieved as porous masonry block walls may require additional coats to obtain desired thickness.
6. Maximum UV exposure period for membrane is four months.

I. Openings and Penetrations in Exterior Weather Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

J. Allow Fluid-Applied Flashing, Joint Compound and Sealant to cure for minimum 24 hours before coating with Fluid-applied Weather Barrier.

K. Fluid Applied Weather Barrier: Install fluid-applied weather barrier prior to installation of windows, doors and louvers.
1. Mask and protect any adjacent finished surfaces from fluid- applied weather barrier material.
2. Install fluid-applied weather barrier over exterior face of required exterior wall substrates in accordance the manufacturer recommendations and instructions.
3. Install fluid-applied weather barrier by spraying or 3/4" nap-rolling method to achieve 75 mils wet, providing a consistent and uniform thickness. Porous masonry block walls may require additional coats to obtain desired thickness.
4. Repair any voids, holidays, or non-uniform installations or damages by other trades to proper mil thickness prior to installation of final cladding assemblies.
5. Hot weather applications: If the material begins to slump, two coats may be necessary. Apply second coat after first coat has completely dried, approximately one to two hours after first coat.
6. Frequently inspect surface area with a wet mil gauge to ensure consistent thickness.

L. Install fluid-applied weather barrier prior to installation of windows, doors, and louvers.

M. Repair any voids, holidays, or non-uniform installations or damage by other trades to proper mil thickness prior to installation of final cladding assemblies.

N. Curing and Drying: Allow material to dry at air and surface temperatures of 20° F (-6.7° C) or higher. Curing times will be affected by relative humidity, temperature and airflow.

3.4 FLASHINGS (NON FLANGED WINDOWS)

A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. Apply 9-inch wide strips of flashing at jambs. Align flashing with interior edge of jamb framing. Start flashing at head of opening and lap sill flashing down to the sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193.

I. Position weather barrier head flap across head flashing. Adhere using flashing over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of ABAA Tests and Inspections:
   1. Provide testing and inspection required by ABAA QAP.
   2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

C. Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation

D. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

E. Take digital photographs of each portion of the installation prior to covering up.

3.6 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

C. Protect installed weather barrier from damage.

END OF SECTION

METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules, keynotes, as specified, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Clean all residual material from the surface of the deck, and the flutes of the steel deck.
2. Install a prefabricated metal roofing system, including .040 inch thick aluminum panels factory finished with Kynar 500 paint, insulation, a gypsum cover board, ice & water shield and rosin paper underlayment, profiled fasciae, and sheet metal trim.
3. Coordinate the installation of metal roofing with other work, to produce a complete finished watertight assembly.
4. Furnish and install any supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation, even though such items may not be specifically indicated.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 04 7200 - Cast Stone Masonry.

C. Section 07 4113 - Metal Roofing

F. Section 07 6200 - Sheet Metal Flashing and Specialties

G. Section 07 7200 - Roof Accessories.

H. Section 09 2662 - Gypsum Sheathing.

1.4 CODE APROVAL REQUIREMENTS

A. Install metal roofing and insulation system components to meet the following minimum requirements:

1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.
2. Underwriters Laboratories Inc. Class A External Fire Rating for roof assemblies tested in accordance with ASTM E 108 or UL 790.
3. Underwriters Laboratories Inc. Standard 1256 for roof assemblies with foam insulation.
4. Underwriters Laboratories UL 90.
5. Minimum wind uplift pressure calculated using ASCE 7 and a safety factor of 2:
   a. Field Zone - 60 psf
   b. Perimeter Zones - 100 psf
   c. Corner Zone - 150 psf

B. Provide written certification from the roof material Manufacturer, before beginning work, to confirm the roofing system meets these requirements.

1.5 QUALITY ASSURANCE

A. Applicable standards:

1. SMACNA: "Architectural Sheet Metal Manual" Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. AISC: "Steel Construction Manual" American Institute of Steel Construction.
3. ASI: "Cold Form Steel Design Manual" American Iron and Steel Institute.
4. ASTM A792-89: Standard Specification for Steel Sheet, Aluminum-Zinc Alloy coated by the Hot Dip Process, General Requirements.
5. ASTM A527-90: Standard Specification for Steel Sheet, Aluminum-Zinc Alloy coated by the Hot Dip Process, Commercial Quality.
6. ASTM A446-91: Standard Specification for Steel Sheet, Aluminum-Zinc alloy coated by the Hot Dip Process, Structural (Physical) Quality.

B. Manufacturer's qualifications:

1. Ten years of continuous experience manufacturing roofing panels and accessory items, of the type specified, in a permanent indoor production facility.

C. Installer's qualifications:

1. A firm (Installer), with not less than 5 years experience installing metal roofing systems similar to those required for this project.
2. The Installer shall provide a reference list of at least three projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Architect or Owner:
   a. The reference list shall include at a minimum, the completion date, type of system, Manufacturer, square foot size, Owner's name - contact person - phone number and address and Architect's name - contact person and phone number.
   b. The Installer shall provide the reference list prior to contract award if requested.
3. The Installer shall directly employ the personnel performing the work of this section.
4. The Installer shall have a full time supervisor/foreman on the roof when work is in progress. The Supervisor shall have a minimum of 5 years experience in roofing work similar in nature and scope to this project, and speak fluent English.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Meet at the project site between one and two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How new insulation and roof underlayments will be kept watertight as the work progresses.
2. How the installation of new roofing will be coordinated with the installation of the insulation, cover board, flashings, underlayments and other items to provide a watertight installation.
3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.
4. The condition of the substrate (deck), curbs, penetrations and other preparatory work needed.
5. Incomplete submittals; note that progress payments will be not processed until all submittals are received and approved.
6. The construction schedule, weather forecast, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.
7. A schedule for Manufacturer and Architect inspections.

1.7 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work on site:

1. A pre-work site and building inspection report with photos to document conditions before work starts.
2. Written certification from the Manufacturer which states that the Installer is acceptable or licensed to install the specified roofing; if not previously provided.
3. Manufacturer’s technical data sheets for each component of the roofing system. Material sample submittals are not needed or wanted. Do not provide material samples unless specifically requested by the Architect.
4. Samples of the Contractor’s Guarantee and Manufacturer’s warranty forms.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.

1. Submittals shall be prepared and made by the firm that will perform the actual work.
2. Provide electronic submittals in pdf format on USB drives, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.6 GUARANTEE/WARRANTY

A. Manufacturer’s Warranties:

1. Provide a warranty issued by the panel Manufacturer, covering bare metal against rupture, structural failure, and perforation due to normal atmospheric corrosion exposure for a period of 20 years from the date of completion.
2. Provide a warranty issued by the finish Manufacturer, covering the panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking, and fading for a period of 20 years.
3. The Manufacturer’s warranties shall provide for the replacement of any panels which leak, or otherwise fail to perform as warranted, at no cost to the Owner.

B. Provide a Contractor's written Guarantee which warrants that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defective work includes but is not limited to the following types of failure: leakage, delamination, lifting, loosening, splitting, cracking, and undue expansion.
2. The Contractor's Guarantee shall provide that the Contractor will make the repairs and modifications necessary to enable the work to perform as warranted at his own expense.
3. The Guarantee shall include the removal and replacement of items or materials installed as part of the original work, if removal is needed to affect guaranteed repairs.

C. Manufacturer's and Contractor's Guarantees/Warranties shall take effect no more than 30 days before the satisfactory completion of punch list work.

D. Guarantees/Warranties shall include the removal and replacement of items or materials installed as part of the original work, if removal is needed to make warranty repairs.

E. Guarantee/Warranty coverage may be cancelled, for the affected portion of the roof, if the work is damaged by winds in excess of 72 mph, by hail, lightning, insects or animals, by failure of the structural substrate, by exposure to harmful chemicals, by other trades on the roof, or by vandalism, or if the Owner fails to maintain the roof in accordance with, or makes roof alterations contrary to, the Manufacturer’s printed recommendations.

F. Guarantee/Warranty coverage shall be reinstated, for the remainder of the original period; if the Owner restores the roof to the condition it was in prior to the damage occurring.

G. The Contractor's Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor's Guarantee.

1.7 SUBSTITUTIONS

A. The following factors will be considered when evaluating a possible alternative to the roofing system specified:

1. The wording and intent of the warranty to be issued.
2. The financial status, numbers of years in business, and stability of the entity that will issue the warranty.
3. A reference list of at least five completed similar projects of comparable size, with a successful functional history of at least five years, within an approximate fifty mile radius of the Project.
4. Technical aspects of the system, especially relating to durability, serviceability and performance.
5. The Manufacturer's ability and history providing technical support, on-site inspections and in progress assistance.
6. The availability and experience of local authorized applicators to install and maintain the proposed alternate system.
7. The Manufacturer's willingness and history responding to warranty claims previously made by the Owner, Architect or any Consultant involved in this project.

1.8 PRODUCT DELIVER, STORAGE AND HANDLING

A. Deliver materials to the site, ready for use in the Manufacturer's original and unopened containers and packaging, bearing labels to indicate the type of material, brand name, and Manufacturer's name.

B. Store materials under cover in a dry and clean location, off the ground. Immediately remove materials which are damaged or otherwise not suitable for installation from the job site, and provide replacement material needed to complete the installation as scheduled.

C. Exercise extreme care when unloading, storing, and erecting panels to prevent bending, warping, twisting, and surface damage.

D. Replace any material that has scratches in the surface finish, or that is otherwise damaged - at no cost to the Owner.

PART 2 - PRODUCTS

2.1 PANELS AND TRIM

A. Products manufactured by UNA-CLAD / Firestone Building Products are specified to establish a standard of quality. Equal products manufactured by other companies will be acceptable if submitted with sufficient technical data to establish color, water tightness, appearance, functional, and warranty term equivalency.

B. Panels: 12 inch wide architectural standing seam panels, fabricated from .040 inch thick aluminum, roll formed on site and furnished in continuous lengths from eave to ridge, with concealed fasteners and clips, and with 1-1/2 inch high double locked seams, as manufactured by UNA-CLAD under the trade name UC-3 Double-Lock Architectural Series Panels.

C. Panel Finish: Smooth texture Kynar 500 or Hylar 5000 finish.

D. Color: As selected from the full range of standard and custom colors.

E. Fabricate hook strips, trim, flashing and accessories to the profiles shown, from the same material and thickness, and with the same finish as the panels, in consistent 8 or 10 foot lengths.

2.2 SUBSTRATE AND UNDERLAYMENTS

A. 5/8 inch thick exterior grade fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 48 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime.

B. Insulation: Flat cellular polyisocyanurate boards with fibrous felt/fiberglass mat facers, minimum compressive strength 20 psi, meeting ASTM C1289-01, Type II, Class1, Grade 2, as manufactured by Firestone under the trade name of "ISO 95+ Isocyanurate Insulation". Minimum thickness 5-1/2 inches as shown on the roof plan.

C. Ice and Water Shield: High temperature 30 mil thick slip resistant, buytl based adhesive coated membrane, intended for use in high temperature applications under sheet metal roofing, with a plastic release layer for peel and stick application directly to a prepared roof deck: WR Grace Vycor Ultra.

D. Rosin Paper: nominal 5-pound rosin paper.

2.3 FASTENERS

A. #14 Fluorocarbon polymer coated heavy duty screws and galvanized steel plates to secure the cover board and insulation.

B. Stainless steel large head roofing nails to secure the rosin paper.

C. #12 pan-cake head stainless steel screws to secure metal roof trim and the metal panel cleats.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Inspect the roof deck and work of other trades and verify that such work is complete to a point where metal panel work may begin.
2. Immediately notify the Architect and Construction Manager, if deficiencies are observed.
3. Do not install substrate, underlayment or metal panel roofing until the deficiencies have been corrected.

3.2 INSULATION AND GYPSUM BOARD INSTALLATION

A. Install gypsum board over steel deck and insulation surfaces, with joints between rows staggered at least 12 inches. Position the boards with tight neat joints. Fill any gaps greater than 1/4 inch.

B. Install insulation with joints offset between rows and layers a minimum of 12 inches. Cut insulation to fit neatly at penetrations and joints. Fill any gap which is greater than 1/4 inch.

C. Fasten all layers of insulation and the gypsum board only to the top flutes of steel decks, with screws and discs which penetrate through the deck a minimum of 3/4 inch and a maximum of 1-1/2 inches.

1. Install 16 fasteners per 4 by 8 foot insulation board in the field of the roof.
2. Install 28 fasteners per 4 by 8 foot insulation board in 8 foot wide perimeter zones.
3. Install 32 fasteners per 4 by 8 foot insulation board in 8 foot square corner zones.
4. Carefully choose the length and position of each screw to ensure the screws do not protrude through the underside of the deck where visible inside the school, and to ensure the screws do not damage conduits mounted on the underside of the deck.

3.3 UNDERLAYMENT

A. Install ice and water shield on all sloped roof surfaces - fully adhered to the gypsum board substrate, and lapped over the metal drip edge to shed water at all roof eaves.

B. Install rosin paper over the ice and water shield with 3 inch wide ply and end laps, just prior to installing the metal panels.

1. Keep the rosin paper dry at all times. Remove and replace rosin paper which gets wet.

3.4 HOOK STRIP AND TRIM INSTALLATION

A. Install hook strips, fascia, and hip and ridge trim pieces in full lengths, with the ends notched to form a telescoping 3inch overlap. Face the overlaps to shed water, and where visible from the ground, away

from prominent building entrance locations. Set the trim overlap into a full bed of sealant which matches the color of the trim.

B. Secure metal trim with concealed screws, positioned 4 inches on center.

3.5 PANEL INSTALLATION

A. Install panels in accordance with Manufacturer's installation instructions and shop drawings, so that they are weather tight, free of waves, warps, buckles, fastening stresses or distortions, with provisions for expansion and contraction.

B. Install panels using concealed clips and anchors.

C. Install panels plumb, level, and straight with seams and rib battens parallel, to achieve the design appearance indicated.

D. Secure the panels with hidden cleats placed 6 inches on center in all seams; fasten each clip with two #11 pan cake head screws. Drive the screws into the underlying metal deck or plywood substrate. Fold the cleats over the screw heads - so the heads do not make contact with the undersides of the metal panels..

3.6 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Conduct an inspection of the interior and exterior of the building and grounds, and submit a written report with photos to document any pre-existing leakage or damage, prior to performing any work.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leakage or damage which was not documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

3.7 ROOF INSPECTIONS BY MANUFACTURER

A. Arrange for the roofing Manufacturer, or his authorized representative, to make a minimum of five inspections in accordance with the following schedule and submit a written report of each inspection to the Architect.
   1. First inspection during the first two days of new roof installation.
   2. Second inspection when roofing is approximately one third complete.
   3. Third inspection when roofing is approximately two thirds complete.
   4. Fourth inspection when all roofing and flashings are installed.
   5. Final inspection at the completion of all work.

B. Provide 48 hours advance written notice to the Architect, so he may have a representative attend the inspections.

C. Submit the inspection reports within one week following each inspection.
   1. Payment requisitions will not be reviewed nor approved until the inspection reports are received.

END OF SECTION

ALUMINUM SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. The extent of aluminum soffit shown on the drawings.

B. Manufactured metal aluminum panels for exterior soffits, with accessory components

C. All metal trim, fasteners and sealants

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications.

B. Section 07 4113 - Metal Roof Panels.

C. Section 07 6200 - Sheet Metal Flashing and Trim.

D. Section 07 9200 - Joint Sealants.

1.4 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

D. ASTM E-330 Structural Performance Tested.

E. New York State Building Code.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's standard printed product data and installation instructions for specified products.

C. Shop Drawings: Indicate dimensions, layout, joints, construction details and methods of anchorage, and thickness, dimension, components of parts and installation instructions.

D. Samples: Submit two samples of soffit panel, 12 inch by 12 inch (305 mm by 305 mm) in size illustrating finish color, sheen, and texture.

E. Affidavit certifying materials meet all requirements as specified.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum Twenty (20) years of documented experience.

B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience and approved by manufacturer.

C. Soffit System shall be designed to meet applicable New York State Building Code and the System shall have tested by the Manufacturer per ASTM E-1592 and have the applicable Load Tables published from this testing for loads.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap and in accordance with panel manufacturer's recommendations.

B. Store material off the ground, in original packaging and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.

1. Exposed Panels Finish - deterioration includes the following:
   a. Cracking, checking, peeling or failure of a paint to adhere to a bare metal
2. Warranty Period: 30 non pro-rated Years from the date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: PAC-850 Full Flush Vent as manufactured by: Petersen Aluminum Corporation, 1005 Tonne Road, Elk Grove Village, Il 60007

2.2 ALUMINUM SOFFIT PANELS

A. Aluminum Soffit Panels:

1. Style: 1" x 12 " wide Flush Panels Solid, except vented at canopy ends.
   a. Thickness: Nominal 0.04; aluminum alloy 3105-H14:
      a) Interlocking edges and elongated nailing hems.
   b. Finish: Alumalure 2000; two-phase operation including corrosion-inhibiting primer and baked-on high-performance acrylic topcoat.
      a) Color: As selected by Architect from manufacturer's full line.

2.3 FINISHES

A. Custom Fluoropolymer Coating System: Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness (DFT) of 0.9 mil (0.023 mm); color and gloss as selected from manufacturer’s standard line.

2.4 ACCESSORIES

A. Accessories: Flashings and Trim Aluminum of same thickness, finish, and color as soffit.

1. Provide "J" channel color to match soffit.

2.5 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest practicable lengths.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate conditions before beginning installation of soffit products; verify dimensions and acceptability of substrate.

1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work

B. Examine alignment of structural steel, framing and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation. Components should comply with shop drawings and be smooth, even, sound and free of depressions.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation. Conform to standards set forth in SMACNA architectural sheet metal manuals and approved shop drawings for this project.

B. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

C. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.

D. Abrasive devices shall not be used to cut on or near soffitpanel system.

E. Fasten panels to structural supports; aligned, level, and plumb.

F. Use concealed fasteners unless otherwise approved by Fuller and D'Angelo P.C.

G. Secure units to supports.

H. Place fasteners as indicated in manufacturer's standards.

I. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.3 ADJUSTING AND CLEANING

A. Clean dirt from surface of installed products, using mild soap and water.

B. After completing installation, remove from project site excess materials and debris resulting from installation.

END OF SECTION

MODIFICATIONS TO EXISTING ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Modification to existing EPDM membrane roofing system.

B. Remove all existing roofing and flashings as required to provide new openings for mechanical equipment as shown on drawings.

C. Cut new openings and install curbs.

D. Fill in abandoned equipment openings.

E. Disposal of removal and construction waste is the responsibility of General Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.

F. Roof top mechanical equipment work is specified else-where. Coordinate with the mechanical contractors to set new curbs and equipment, and make modifications to the existing curbs and equipment; then install new roof flashings as indicated.

G. Install new support steel and decking, insulation to finish flush with the deck substrate, new insulation and roofing to make the building permanently watertight - within 72 hours after each piece of equipment is removed.

H. Maintain building watertight at all times.

I. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.3 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications. Roofing modifications required by miscellaneous roof supports.

B. Section 06 1010 - Roof Related Rough Carpentry Wood nailers associated with roofing and roof insulation.

C. Section 07 6200 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.

D. Section 07 7200 - Roof Accessories: Roof hatches, vents, and manufactured curbs.

1.4 REFERENCE STANDARDS

A. ASTM D1079 <http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=ASTM D1079> - Standard Terminology Relating to Roofing and Waterproofing; 2016.

B. PS 1 <http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=APA PS 1> - Structural Plywood; 2009.

C. PS 20 <http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=ALSC PS 20> - American Softwood Lumber Standard; 2010.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Before start of roofing work, General Construction Contractor shall hold a meeting to discuss the proper installation of materials, status of the existing warranty, requirements to maintain the existing warranty, and manufacturer's approval of the installer and requirements to maintain the existing warranty..

1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
2. Notify Architect or Construction Manager well in advance of meeting.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
1. Provide manufacturer's printed data sufficient to show that all components of roofing systems, including insulation and fasteners, comply with the specified requirements and with the roofing manufacturer's requirements and recommendations for the system type specified; include at least the following:.
a. Technical data sheet for roof membrane.
b. Technical data sheets for splice tape and adhesives.
c. Technical data sheet for each insulation type.
d. Technical data sheet for pavers.
2. Where the existing roofing system is UL or FM approved provide documentation that shows that the modification installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
3. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
4. Pre-Work Site and Building Inspection Report with photos to documents conditions before commencing work.
5. Written certification from the manufacturer which states that the installer is acceptable or licensed to install the specified roofing; if not previously provided.

C. Shop Drawings: Provide:
1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.

D. Specimen Warranty: Submit manufacturer's certification that work installed will maintain the existing warranty prior to starting work.

E. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications for all systems under warranty.

F. Executed Warranty.

1.7 CODE APPROVAL REQUIREMENTS

A. Install roofing and insulation system components to meet the following minimum requirements:
1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.
2. Underwriters Laboratories Inc. Class A External Fire Rating for roof assemblies tested in accordance with ASTM E 108 or UL 790.
3. Underwriters Laboratories Inc. Standard 1256 for roof assemblies with foam insulation.
4. Minimum wind uplift pressure calculated using ASCE 7 and a safety factor of 2:
a. Field Zone - 90 psf
b. Perimeter Zones - 135 psf
c. Corner Zone - 180 psf

B. Provide written certification from the roof material Manufacturer, before beginning work, to confirm the roofing system meets these requirements.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Roofing installer shall have the following:
   1. A firm (Installer) with not less than 5 continuous years experience performing EPDM roofing work similar to that required for this project, employing personnel skilled in the specified work.
      a. The Installer shall directly employ the personnel performing the work of this section.
      b. The Installer shall have a full time supervisor/foreman on the roof when roofing work is in progress. The Supervisor shall have a minimum of 5 years experience in roofing work similar in nature and scope to this project, and speak fluent English.
      c. The Installer shall provide a reference list of at least three projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:
         a) The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number.
         b) The Installer shall provide the reference list prior to contract award if requested.
      d. The Installer shall be acceptable to or licensed by the Manufacturer of the primary roofing materials, and provide written certification from the Manufacturer to confirm this prior to award if requested.

B. Material Quality: Obtain each product, including the insulation, cover board, EPDM roofing and flashing, and cements, primers and adhesives produced by a single Manufacturer, which has manufactured the same products in the United States of America for not less than 5 continuous years.

C. Pre-Work Conference: Meet at the project site approximately one week prior to starting roof work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:
   1. How the building will be kept watertight as old roofing is removed and the work progresses.
   2. How new roofing work will be coordinated with mechanical equipment work, replacement of deteriorated existing insulation and the installation of new insulation, cover board, flashings and other items to provide a watertight installation.
   3. Generally accepted industry practice, the Manufacturer's instructions for handling and installing his products, and project specific work requirements.
   4. The condition of the substrate (deck), curbs, penetrations and preparatory work needed by trades other than the roofer.
   5. Submittals, if any remain incomplete.
   6. The construction schedule, weather forecast for the work period, availability of materials, personnel, equipment and facilities needed to proceed and complete the work in an expeditious manner and on schedule.
   7. A schedule for Manufacturer and Architect inspections.

1.9 JOB CONDITIONS (CAUTIONS & WARNINGS)

A. Do not use oil base or plastic roof cement with EPDM roofing. Do not allow waste products, (petroleum grease or oil, solvents, vegetable or mineral oil, animal fat) or direct steam venting to come in contact with any roofing, insulation or flashing product. Do not expose EPDM roofing and accessories to a temperature in excess of 175 degrees Fahrenheit.

B. Splice cleaner, primer, cements and bonding adhesives are flammable. Do not breathe vapors or use near fire or flame or in a confined or unventilated area. Dispense only from a UL listed or approved safety can.

C. Remove empty adhesive and solvent containers and contaminated rags from the roof and legally dispose of them daily.

D. Do not apply adhesives adjacent to open ventilation system louvers, or windows. Temporarily cover the louvers and windows with 6 mil fire retardant polyethylene and prevent adhesive odors from entering the building. Remove temporary covers at the end of each days work.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, bearing labels which identify the type and names of the products and Manufacturers, with the labels intact and legible.

B. Cover all stored materials, except rolls of EPDM and sealed cans of adhesives, with watertight tarpaulins installed immediately upon delivery.

C. Immediately remove any insulation which gets wet from the job site.

D. Do not overload the structure when storing materials on the roof.

E. Store and install all material within the Manufacturer's recommended temperature range.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Existing Roof System Under Warranty

1. The existing roofing system is under warranty and the General Construction Contractor or their subcontractor must notify and be authorized by the manufacturer to perform all work as per the manufacturer's instruction.
    a. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty.
    b. b.
2. Comply with all warranty procedures required by manufacturer, including notifications Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty, scheduling, and inspections:
3. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty Contractors warranty.
4. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.

C. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.

D. Guarantees/Warranties shall include the removal and replacement of items or materials superimposed over the EPDM roof as part of the original work, if removal is needed to make warranty repairs.

PART 2 PRODUCTS

2.1 GENERAL

A. Acceptable Manufacturer - Roofing System: Match existing manufacturers roofing system.

1. Roofing systems by other manufacturers are not acceptable if existing roof is under warranty.
2. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
    a. Specializing in manufacturing the roofing system to be provided.
    b. Minimum ten years of experience manufacturing the roofing system to be provided.

B. Substitutions: See Section 01 2500 - Substitution Procedures

2.2 EPDM ROOFING

A. Unreinforced 60 mils thick, fire retardant, EPDM (Ethylene Propylene Diene Monomer) sheet membrane conforming to the following minimum physical properties.

	PROPERTY	TEST METHOD	SPECIFICATION
2.	Color-		Gray/Black
3.	Elongation	ASTM D-412	300% min
4.	Tear Strength	ASTM D-624	150 lb/in min
5.	Ozone Resistance days/100 strain	ASTM D-1149	No cracks, 7 pphm/100ºF/50%
6.	Heat Aging	ASTM D-573	1200 psi min@ 200% elongation/4 wks/240ºF
7.	Brittleness Temperature	ASTM D-746	-49ºF
8.	Water Vapor Permanence	ASTM E-96	2.0 perm max
9.	Thickness	ASTM D-412	60 mils plus/minus 6 mils
10.	Fire Retardant		UL Class A

B. Related Materials:

1. Cleaners, adhesives, sealants, caulking and fasteners furnished by the EPDM system Manufacturer. Use low VOC adhesives and cleaners to comply with regulations in effect at the time of application.
   a. Stripping: 90 mil thick 5 inch and 9 inch wide self adhering flashing, consisting of 45 mils of semi-cured EPDM factory laminated to 45 mils of cured seaming tape.
   b. Bonding Adhesive: High strength contact adhesive.
   c. Splice Adhesive: High strength synthetic polymer based contact cement formulated specifically to splice EPDM sheets.
   d. Lap Sealant: EPDM rubber based gun grade sealant.
   e. Water Block Seal: One component low viscosity butyl rubber sealant.
   f. Pre-Molded Pipe Flashing: Pressure sensitive prefabricated flashings with pre-applied adhesive.
   g. Pourable Sealer: Two component, solvent free polyurethane based sealant.
   h. Reinforced Perimeter Fastening Strips: .030 inch thick reinforced cured EPDM.
   i. Seam Tape Primer: Synthetic rubber polymer based primer designed to clean and prime seam tape spice areas prior to installing the tape.
   j. Seam Splice Tape: Nominal 30 mil thick cured polymer self adhesive tape with release paper carrier, 6 inches wide.
   k. Plates and Bars: Galvanized and corrosion resistant specialty products.
   l. Fasteners: #14 Fluorocarbon polymer coated heavy duty screws.

C. Gypsum Cover Board: 1/4 inch thick fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 48 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime

2.3 INSULATION:

A. Isocyanurate - Tapered rigid cellular polyisocyanurate boards with fibrous felt/fiberglass mat facers, sloping 1/2 inch per foot, minimum starting thickness 1-1/2 inches, minimum compressive strength 20 psi, meeting ASTM C1289-01, Type II, Class1, Grade 2.

1. Tapered insulation sloping 1/4 inch per foot, minimum starting thickness as shown on the roof plan.
2. Crickets sloping 1/4 inch per foot.
3. At repairs to existing building match thickness of existing insulation.

4. Product: Firestone “ISO 95+ Isocyanurate Insulation” or approved equal.

2.4 ACCESSORY MATERIALS

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1 <http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=APA PS 1>, APA Exterior Grade plywood.
   1. Thickness: Same as thickness of roof insulation.

B. Cant Strips and Tapered Edge Strips: 45 degree face slope and minimum 5 inch (127 mm) face dimension; provide at all angle changes between vertical and horizontal planes that exceed 45 degrees.

PART 3 INSTALLATION

3.1 GENERAL

A. Construct the new roofing system in a watertight, workmanlike manner, meeting the guarantee requirements specified herein; in strict accordance with the drawings and in conformance with the Manufacturer's requirements, except as enhanced in this specification.

B. Perform work at areas with roof mounted mechanical equipment, so the work coincides with equipment shutdown periods and does not affect building occupants. Temporarily cover and protect equipment openings, and windows adjoining the work area, with 6 mil fire retardant polyethylene, so dirt, dust and odors do not enter the equipment or building. Remove covers at the end of each workday, and as soon as roof work is complete.

C. Clean the surface on which roofing system components will be applied, of all laitance, dirt, oil, grease or other foreign matter which would in any way affect the quality of the installation.

D. Install roof system components on dry surfaces only. Do not install any items when weather conditions and outside temperatures are not suitable in accordance with the Manufacturer's recommendations.

E. Complete all work in sequence as quickly as possible so that as small an area as practicable is in the process of construction at any one time. Complete the entire area of work begun each day, the same day, and make all exposed edges watertight at the end of each day's work.

3.2 SUBSTRATE INSPECTION

A. Remove portions of existing roofing, insulation, and flashings, and carefully check the existing deck and new roof substrate. To be an acceptable surface for the new roofing system, the deck and substrate shall be well secured to the underlying structure, dry and not otherwise deteriorated.

B. Immediately notify the Architect and Owner by telephone and in writing if defects in the substrate are discovered.

C. Maintain the building watertight in the interim, but do not install new insulation or roofing until substrate defects have been corrected.

3.3 DECK REPAIR

A. Steel deck repairs:
   1. Remove damage decking across the entire width of individual sections by a length equal to a minimum of two joist bays.
   2. Install new galvanized steel decking, to match the thickness, gauge and cross section configuration of the existing deck.
   3. Fasten new deck to the joists / beams with #12 screws spaced 6 inches on center in each joist / beam.
   4. Stitch side seams of steel deck with #10 screws spaced 24 inches apart.

3.4 PREPARATION

A. Remove all of the existing roof system down to the roof deck including all existing composition base flashings. Dispose of all materials properly. Perform asbestos removal in accordance with federal, state and local regulations and dispose of waste in legal manner.

1. At penetrations, remove all existing flashings, including lead, asphalt, mastic, etc.
2. At walls, curbs, and other vertical and sloped surfaces, remove loose and unsecured flashings; remove mineral surfaced and coated flashings; remove excessive asphalt to provide a smooth, sound surface for new flashings.

B. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

C. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

D. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.

E. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.5 SINGLE-PLY MEMBRANE INSTALLATION

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Fully adhere EPDM to the substrate with bonding adhesive, on all roof areas except the terrace courtyard.
1. Allow contact bonding adhesive to dry to the touch before joining the EPDM to the substrate. Roll the EPDM onto the bonding adhesive and immediately rub it vigorously with a soft bristle broom to ensure complete adhesion.
2. Do not punch holes in cans of adhesive and use them in a “Better Spreader” without first opening the cans to mix them.
3. Replace used roller covers each day; discard covers after each days use.
4. Allow bonding adhesive to dry to the touch before joining the EPDM to the substrate.
5. Allow bonding adhesive to dry to the touch before joining the EPDM to the substrate.

E. Roofing installed over improperly applied adhesive or with adhesive that wasn’t stirred, and roofing installed with blisters, ridges, mole runs and similar deficiencies shall be removed and replaced at the Contractor’s expense

F. Mechanical Attachment: Install fasteners in the seams, covered by membrane.
1. Lay out fasteners in compliance with FM Class specified in PART 2, as recommended by membrane manufacturer, and as indicated, whichever is most stringent.
2. Properly engage fasteners in the deck with head flush with the countersunk portion of seam plate.

G. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
1. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.6 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

3.7 FINISHING AND WALKWAY INSTALLATION

A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.
   1. Use specified walkway pads unless otherwise indicated.

B. Walkway Pads: Adhere each pad to the roof surface with 5 strips of seam tape, space the pads 3 inches apart to allow for drainage.
   1. If installation of walkway pads over field fabricated splices or within 6 inches (150 mm) of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches (150 mm) on either side.
   2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

3.8 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

B. Perform all corrections necessary for issuance of warranty.

3.9 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.10 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

EPDM ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules, and keynotes, as specified, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Inspect the underside of the roof deck before starting work, and periodically each day as work occurs, to determine if there are conduits, pipes, ceiling hangers or fixtures next to the deck or fastened to the deck that could be affected as roof work occurs.
    a. Perform roof work so any conduits, pipes, ceiling hangers or fixtures are not disturbed.
    b. Replace and reset any conduits, pipes, ceiling hangers or fixtures that are affected by the work.
2. Clean all residual material, including snow, ice and water, from the surface of the decks, and from within the flutes of the steel decks, immediately prior to installing the new insulation.
3. Install a fully adhered unreinforced 60 mil thick EPDM roofing system, including insulation, cover board, flashing, stripping and related accessories.
4. Provide any miscellaneous mechanical, electrical, hoisting and other work needed, and remove, adjust, modify, reset and reconnect all roof-mounted and roof-penetrating equipment.
5. Install new flashings at the roof drains, and all roof-mounted and roof-penetrating equipment.
6. Cover rooftop ductwork with isocyanurate insulation and fully adhered unreinforced EPDM. Configure the insulation so the top surfaces slope 1/4 inch per foot for drainage. Install acrylic color coating on the EPDM duct wrap.
7. Protect all roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 04 7200 - Cast Stone Masonry.

C. Section 07 4113 - Metal Roofing

F. Section 07 6200 - Sheet Metal Flashing and Specialties

G. Section 07 7200 - Roof Accessories.

H. Section 09 2662 - Gypsum Sheathing.

1.4 CODE APPROVAL REQUIREMENTS

A. Install roofing and insulation system components to meet the following minimum requirements:

1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.
2. Underwriters Laboratories Inc. Class A External Fire Rating for roof assemblies tested in accordance with ASTM E 108 or UL 790.
3. Underwriters Laboratories Inc. Standard 1256 for roof assemblies with foam insulation.
4. Minimum wind uplift pressure calculated using ASCE 7 and a safety factor of 2:
    a. Field Zone - 60 psf

b. Perimeter Zones - 100 psf

c. Corner Zone - 150 psf

B. Provide written certification from the roof material Manufacturer, before beginning work, to confirm the roofing system meets these requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with at least 5 continuous years experience performing work similar to that required for this project, employing personnel skilled in the work specified.

   a. The Installer shall directly employ the personnel performing the work of this section.

   b. The Installer shall have a full time Supervisor on the roof when roofing work is in progress. The Supervisor shall have a minimum of 5 years experience with work similar in nature and scope to this project, and speak fluent English.

      1. Identify the intended Supervisor, and provide his resume upon request.

2. The Installer shall provide a reference list of at least three previously completed projects of comparable size and similar design within a fifty mile radius of this project, which may be observed by representatives of the Owner:

   a. The reference list shall include the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number, and the Contractor's Supervisor's name.

   b. Provide the reference list prior to contract award if requested.

3. The Installer shall be acceptable to or licensed by the Manufacturer of the primary roofing materials, and provide written certification from the Manufacturer to confirm this prior to award if requested.

B. Material Quality: Obtain each product, including the insulation, cover board, EPDM roofing and flashing, and the cements, primers and adhesives from a single Manufacturer, which has manufactured the same products in the United States of America for not less than 5 continuous years.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Meet at the project site between one and two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How new insulation and roofing installed to date will be kept watertight as the work progresses.

2. How the installation of new roofing will be coordinated with the installation of the insulation, cover board, flashings and other items to provide a watertight installation.

3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.

4. The condition of the substrate (deck), curbs, penetrations and other preparatory work needed.

5. Incomplete submittals; note that progress payments will be not processed until all submittals are received and approved.

6. The construction schedule, weather forecast, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.

7. A schedule for Manufacturer and Architect inspections.

1.7 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work on site:

1. A pre-work site and building inspection report with photos to document conditions before work starts.

2. Written certification from the Manufacturer which states that the Installer is acceptable or licensed to install the specified roofing; if not previously provided.
3. Manufacturer's technical data sheets for each component of the roofing system. Material sample submittals are not needed or wanted. Do not provide material samples unless specifically requested by the Architect.
4. Samples of the Contractor's Guarantee and Manufacturer's warranty forms.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.
1. Submittals shall be prepared and made by the firm that will perform the actual work.
2. Provide electronic submittals in pdf format on USB drives, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.8 JOB CONDITIONS (CAUTIONS & WARNINGS)

A. Do not use oil or solvent based roof cement with EPDM roofing. Do not allow waste products, (petroleum grease or oil, solvents, vegetable or mineral oil, animal fat) or direct steam venting to come in contact with any roofing, insulation or flashing product. Do not expose EPDM roofing and accessories to a temperature in excess of 175 degrees Fahrenheit.

B. Splice cleaner, primer, cements and bonding adhesives are flammable. Do not breathe the vapors or use these products near fire or flame or in a confined or unventilated area. Dispense only from a UL listed safety can or the Manufacturer's original container.

C. Remove empty adhesive, cleaner and solvent containers and contaminated rags from the roof and legally dispose of them daily.

D. Do not apply primer, cleaners or adhesives next to ventilation system louvers or windows. Temporarily cover the louvers and windows with 6 mil fire retardant polyethylene and prevent odors from entering the building. Remove temporary covers at the end of each days work.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, with intact and legible labels which identify the products and Manufacturers,

B. Cover all stored materials, except rolls of EPDM and sealed cans of adhesives, with watertight tarpaulins installed immediately upon delivery.

C. Immediately remove insulation which gets wet from the job site.

D. Do not overload the structure when storing materials on the roof.

E. Store and install all material within the Manufacturer's recommended temperature range.

F. Protect all roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.10 GUARANTEE AND WARRANTY

A. Provide a written Manufacturer's Full System Warranty which warrants that the roofing system, including the insulation, cover board, EPDM roofing and flashings, will remain in a watertight condition for a twenty year period beginning upon Final Completion.
1. Guarantee coverage shall remain in effect for gust wind speeds up to 72 miles per hour, measured at ground level at the site.
2. Guarantee coverage shall have no dollar value limit.

B. Provide a written Contractor's Guarantee which guaranties that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: leakage, adhesive separation, delamination, lifting, loosening, splitting, cracking, and undue expansion or shrinkage.
2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as guaranteed at his own expense:
3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to affect guaranteed repairs.
4. Guarantee coverage shall remain in effect for gust wind speeds up to 72 miles per hour, measured at ground level at the site.
5. Guarantee coverage shall have no dollar value limit.
6. Provide one Contractor's Guarantee that covers "all work performed" when a single contractor is awarded work specified in multiple Sections.
7. The Contractor's Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor's Guarantee.

C. The Manufacturer's Warranty and Contractors Guarantee shall take effect no more than 30 days before the completion of all punch list work.

D. Guarantee and Warranty coverage may be cancelled, for the affected portion of the roof, if the work is damaged by winds in excess of 72 mph, by hail, lightning, insects or animals, by failure of the structural substrate, by exposure to harmful chemicals, by other trades on the roof, or by vandalism, or if the Owner fails to maintain the roof in accordance with, or makes roof alterations contrary to, the Manufacturer's printed recommendations.

1. Guarantee and Warranty coverage shall be reinstated, for the remainder of the original period; if the Owner restores the roof to the condition it was in prior to the damage occurring.

1.11 SUBSTITUTIONS

A. The following factors will be considered when evaluating a possible alternative to the roofing system specified:

1. The wording and intent of the warranty to be issued.
2. The financial status, numbers of years in business, and stability of the entity that will issue the warranty.
3. A reference list of at least five completed similar projects of comparable size, with a successful functional history of at least five years, within an approximate fifty mile radius of the Project.
4. Technical aspects of the system, especially relating to durability, serviceability and performance.
5. The Manufacturer's ability and history providing technical support, on-site inspections and in progress assistance.
6. The availability and experience of local authorized applicators to install and maintain the proposed alternate system.
7. The Manufacturer's willingness and history responding to warranty claims previously made by the Owner, Architect or Consultant's involved in this project.

PART 2 - PRODUCTS

2.1 GENERAL

A. EPDM roof system components are specified as products of Firestone Building Products Company to establish a standard of quality. Equal products and systems from Carlisle SynTec or Johns Manville will be accepted.

B. Primary products required for this project include:

1. Roof insulation
2. Cover board
3. EPDM roofing
4. Primers and adhesives
5. Sealants
6. EPDM flashing
7. Fasteners
8. Acrylic coating

2.2 EPDM

1. Unreinforced 60 mils thick, fire retardant, EPDM (Ethylene Propylene Diene Monomer) sheet membrane conforming to the following minimum physical properties.

PROPERTY	TEST METHOD	SPECIFICATION
Color	—	Gray/Black
Tensile Strength	ASTM D-412	1305 psi min.
Elongation	ASTM D-412	300% min
Tear Strength	ASTM D-624	150 lb/in min
Ozone Resistance	ASTM D-1149	No cracks, 7 days/100 pphm/100ºF/50% strain
Heat Aging	ASTM D-573	1200 psi min@ 200% elongation/4 wks/240ºF
Brittleness Temperature	ASTM D-746	-49ºF
Water Vapor Permanence	ASTM E-96	2.0 perm max
Thickness	ASTM D-412	60 mils plus/minus 6 mils
Fire Retardant		UL Class A

2. Self Adhesive EPDM roofing will be accepted only if the installation schedule indicates that all roofing will be applied strictly within the Manufacturer's recommended temperature range.

   a. The same type of EPDM material - SA EPDM or regular EPDM with field applied bonding adhesive, shall be used for the entire project.

   b. SA EPDM that is applied with mole runs, blisters, or similar un-adhered sections shall be removed and replaced at the Contractor's expense. Removal and replacement work shall include the underlying cover board and insulation so the finished roof consists of a complete new un-compromised assembly.

      1. Claims by the material Manufacturer, that mole runs, blister and similar un-adhered deficiencies won't affect performance will not change this requirement.

2.3 RELATED MATERIALS

A. Cleaners, adhesives, sealants, caulking and fasteners furnished by the EPDM system Manufacturer, that comply with low VOC regulations in effect at the time of application.

1. Stripping: 90 mil thick 5 inch and 9 inch wide self adhering flashing, consisting of 45 mils of semi-cured EPDM factory laminated to 45 mils of cured seaming tape.
2. Bonding Adhesive: High strength contact adhesive.

3. Splice Adhesive: High strength synthetic polymer based contact cement formulated specifically to splice EPDM sheets.
4. Lap Sealant: EPDM rubber based gun grade sealant.
5. Water Block Seal: One component low viscosity butyl rubber sealant.
6. Pre-Molded Pipe Flashing: Pressure sensitive prefabricated flashings with pre-applied adhesive.
7. Pourable Sealer: Two component, solvent free polyurethane based sealant.
8. Reinforced Perimeter Fastening Strips: .030 inch thick reinforced cured EPDM.
9. Seam Tape Primer: Synthetic rubber polymer based primer designed to clean and prime seam tape spice areas prior to installing the tape.
10. Seam Splice Tape: Nominal 30 mil thick cured polymer self adhesive tape with release paper carrier, 6 inches wide for field applied tape, and 3 inches wide for factory applied tape.
11. Plates and Bars: Galvanized and corrosion resistant specialty products.
12. Fasteners: #14 Fluorocarbon polymer coated heavy duty screws.

B. Gypsum Cover Board: 1/4 inch thick fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 48 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime.

C. Gypsum Sheathing - for vertical flashing surfaces: 5/8 inch thick fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 48 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime.

D. Insulation: Flat and tapered rigid cellular polyisocyanurate boards with fibrous felt/fiberglass mat facers, minimum compressive strength 20 psi, meeting ASTM C1289-01, Type II, Class1, Grade 2, as manufactured by Firestone under the trade name of “ISO 95+ Isocyanurate Insulation”. Minimum thickness 5-1/2 inches as shown on the roof plan.

1. Tapered insulation sloping 1/4 inch per foot.
2. Crickets sloping 1/2 inch per foot.

E. Tapered edge strips – high density isocyanurate or wood fiberboard strips installed at the drain sumps, and insulation transition points.

F. Insulation adhesive: Two component low rise polyurethane foam adhesive, installed with a mixing extruding Pace Cart dispenser, or with a pleural heated foam rig, Firestone I.S.O. Adhesive.

1. Use insulation adhesive suitable for application at the intended application temperatures.
2. Do not use twin cartridge “caulking gun” adhesive except on very small isolated sections of roof.

G. Acrylic Color Coating: Latex based acrylic coating containing 67% solids by weight, resistant to heat, cold water, ozone, ultraviolet rays, and intended for installation on weathered EPDM. Custom color tint as selected by the Architect.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the new roofing system in a watertight, workmanlike manner, meeting the guarantee requirements specified herein; in accordance with the drawings and in conformance with the Manufacturer's requirements, except as enhanced by the drawings and specifications.

B. Perform work next to roof mounted mechanical equipment and windows, so the work coincides with equipment shutdown periods and building vacancies, and does not affect building occupants. Temporarily cover and protect equipment openings, and windows next to the work area, with 6 mil fire retardant polyethylene, so dirt, dust and odors do not enter the equipment or building. Remove covers as soon as the work is complete and at the end of each workday.

C. Clean substrate surfaces of all laitance, dirt, oil, grease or other foreign matter.

D. Remove debris daily and as it is generated. Do not stock-pile debris on the roof. Do not leave any debris on the roof at the end of the day. Do not overload the roof structure when moving debris.

E. Install roof system components on dry surfaces only. Do not install any components when the weather and outside temperatures are not suitable in accordance with the Manufacturer's recommendations.

F. Complete all work including the equipment flashings, in sequence as quickly as possible so the smallest area possible is under construction at any one time. Complete the entire area of work begun each day, the same day, and make all exposed edges watertight at the end of each day's work.

G. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

3.2 SUBSTRATE INSPECTION

A. Carefully inspect the roof deck before beginning work. To be an acceptable surface for the new roofing system, it is to be well secured to the underlying structure and not otherwise damaged of deteriorated.

B. Immediately notify the Architect and Owner by telephone and in writing if defects in the substrate are discovered.

C. Do not install new roof system components until defects have been corrected.

3.3 INSULATION AND COVER BOARD

A. Install tapered insulation neatly cut at all miters and transitions. Do not lace corner boards.

B. Install insulation with joints offset between rows and layers a minimum of 12 inches. Cut insulation to fit neatly at penetrations and joints. Fill any gap which is greater than 1/4 inch.

C. Fasten all layers of insulation only to the top flutes of steel decks, with screws and discs which penetrate through the deck a minimum of 3/4 inch and a maximum of 1-1/2 inches.

1. Install 16 fasteners per 4 by 8 foot insulation board in the field of the roof.
2. Install 28 fasteners per 4 by 8 foot insulation board in 8 foot wide perimeter zones.
3. Install 32 fasteners per 4 by 8 foot insulation board in 8 foot square corner zones.
4. Carefully choose the length and position of each screw to ensure the screws do not protrude through the underside of the deck where visible inside the school, and to ensure the screws do not damage conduits mounted on the underside of the deck.

D. Install gypsum cover board using low rise polyurethane foam adhesive applied in accordance with the Manufacturer’s recommendations and to achieve the specified minimum uplift resistance, with joints offset between the insulation and cover board a minimum of 12 inches. Cut gypsum cover board to fit neatly at penetrations and joints. Fill any gap which is greater than 1/4 inch.

1. Install 1/2 inch diameter adhesive beads 12 inches on center in the field of the roof.
2. Install 1/2 inch diameter adhesive beads 6 inches on center in 8 foot wide perimeter zones.
3. Install 1/2 inch diameter adhesive beads 4 inches on center in 8 foot square corner zones.
4. Place 5 gallon pails half full of gravel or concrete on the insulation and gypsum cover boards to hold them firmly in position for at least 15 minutes while the low rise foam adhesive sets. Position the pails no more than 24 inches apart in all directions.
5. Remove and replace any cover board, and the underlying insulation, that is installed without using pails of gravel or concrete for ballast.

3.4 EPDM

A. Place EPDM roofing on the substrate without stretching it, and allow it to relax approximately one hour – before starting to adhere it to the substrate and form the seams.

B. Place adjoining sheets in the same manner lapping the edges to shed water.

C. Fully adhere EPDM to the substrate with bonding adhesive.

1. Open each can of adhesive and stir it with an electric paddle mixer for at least 5 minutes before applying the adhesive. Re-stir adhesive that isn't used within two hours of initial mixing.
2. Do not punch holes in cans of adhesive and use them in a "Better Spreader" without first opening the cans to mix them.
3. Replace used roller covers each day; discard covers after each days use.
4. Allow bonding adhesive to dry to the touch before joining the EPDM to the substrate.
5. Roll the EPDM onto the dried bonding adhesive and immediately rub it vigorously with a soft bristle broom to ensure complete adhesion.

D. EPDM installed over improperly applied adhesive or with adhesive that wasn't stirred, and roofing installed with blisters, ridges, mole runs and similar deficiencies shall be removed and replaced at the Contractor's expense. Removal shall include the insulation and cover board assembly.

3.5 SPLICING

A. Form EPDM roof splices with 6 inch wide field applied seam tape, or with 3 inch wide factory applied seam tape.

1. Fold the top sheet back and clean mating surfaces using clean rags with splice wash.
2. Scrub a smooth coat of primer onto the mating surfaces, with long strokes, and to obtain complete coverage, using approximately 1 gallon per 225 square feet. Do not allow the primer to glop, streak or puddle; allow it to dry to the touch before installing the seam tape.
3. Seam tape shall be positioned so 1/8 inch minimum and 1/2 inch maximum will be exposed at the seam edge when the seam is complete.
    a. Install 5 inch uncured EPDM stripping over any seam where the tape is exposed less than 1/8 inch or more than 1/2 inch.
4. Roll and allow the top sheet to fall freely into place without stretching or wrinkling it.
5. Pull splice tape release paper from within the seam and neatly mate the seam using hand pressure to rub the membrane together.
6. Immediately roll the splice with a 2 inch wide roller, using positive pressure, toward the outer edge of splice.

B. Install uncured EPDM target patches with rounded corners, over all T-Seam intersections.

3.6 PERIMETER FASTENING

A. Secure the EPDM at the perimeter of each roof level, and at eaves, penetrations, expansion joints and slope changes greater than 1 inch in 12 inches. Utilize surface applied discs or adhere the EPDM to continuous reinforced EPDM fastening strips. Secure the discs and EPDM fastening strips 12 inches on center.

3.7 FLASHINGS

A. Utilized cured EPDM for all flashings; utilize self-curing EPDM at corners and angle changes only where required by the Manufacturer.

1. Form flashing splices, and the splice between the flashing and main roof sheet with 6 inch seam tape.
2. Adhere the flashing to vertical surfaces with bonding adhesive.
3. Fasten the top edge of all flashings, positioning the fasteners 12 inches on center, to be covered by a cap flashing.

B. Install premolded pipe flashings wherever possible. Where premolded pipe flashings cannot be installed, use field wrapped flashings. Install sealant pockets as a last resort.

3.8 DUCT WRAP WATERPROOFING:

A. Inspect the ducts and remove any residual tape or other debris from their surfaces before wrapping them. Cover the ductwork with isocyanurate insulation and fully adhered 60 mil thick EPDM roofing.

1. Install EPDM cover strips and target patches to seal all duct air leaks before installing the insulation. .
2. Install flat 3 inch thick insulation on the sides and bottom of the ducts.
3. Install tapered insulation sloping 1/4 inch per foot, minimum-starting thickness 3 inches, on top of the ducts.
4. Secure the isocyanurate insulation with screws and plates, installed at the rate of one fastener per 2 square feet.
5. Cover the insulation with fully adhered 60 mil fire retardant EPDM.
6. Install two roller applied coats of acrylic color coating on the EPDM duct cover.

3.9 ACRYLIC COLOR COATING:

A. Install two roller applied coats of acrylic color coating, only after the EPDM waterproofing is complete and approved in writing by the Architect.

B. Apply the coating to achieve a neat uniform color coated surface free of roller and brush marks or adhesive bleed through.

3.10 MISCELLANEOUS

A. Provide any miscellaneous roofing, flashing, caulking, and metal work needed to leave the new roof complete and entirely watertight, neatly and carefully executed in a thorough and workmanlike manner.

B. Use mechanics skilled and licensed in the trades to perform mechanical and electrical work. Provide new material, couplings, transition pieces, blocking, fasteners and the like needed to complete the work.

3.11 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage, prior to performing any other work on site.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leaks and damage that weren't documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

3.12 ROOF INSPECTIONS BY MANUFACTURER

A. Arrange for the roofing Manufacturer, or his authorized representative, to make a minimum of five inspections in accordance with the following schedule and submit a written report of each inspection to the Architect.

1. First inspection during the first two days of new roof installation.
2. Second inspection when roofing is approximately one third complete.
3. Third inspection when roofing is approximately two thirds complete.

4. Fourth inspection when all roofing and flashings are installed.
5. Final inspection at the completion of all work.

B. Provide 48 hours advance written notice to the Architect, so he may have a representative attend the inspections.

C. Submit the inspection reports within one week following each inspection.
1. Payment requisitions will not be reviewed nor approved until the inspection reports are received.

END OF SECTION

SHEET METAL FLASHINGS & SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules and keynotes, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Sheet metal work that is compatible with the roofing systems specified, including cap and through wall flashings, hook strips, fascia, drip edges, factory fabricated roof edge systems, copings, gutters, leaders, standing seam panels and miscellaneous flashings.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 04 7200 - Cast Stone Masonry.

C. Section 07 4113 - Metal Roofing

D. Section 07 5323 - EPDM Roofing

F. Section 07 6200 - Sheet Metal Flashing and Specialties

G. Section 07 7200 - Roof Accessories.

H. Section 09 2662 - Gypsum Sheathing.

1.4 CODE APPROVAL REQUIREMENTS

A. Fabricate and install roof perimeter flashings that comply with the NY State Uniform Fire Prevention and Building Code and with ANSI/SPRI ES-1 “Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems” requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with at least 5 continuous years experience performing work similar to that required for this project, employing personnel skilled in the work specified.

   a. The Installer shall directly employ the personnel performing the work of this section.

   b. The Installer shall have a full time supervisor on the roof when work is in progress. The Supervisor shall have a minimum of 5 years experience with work similar in nature and scope to this project, and speak fluent English.

2. The Installer shall provide a reference list of at least three previously completed projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:

   a. The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner’s name - contact person - phone number and address and the Architect’s name - contact person and phone number.

   b. The Installer shall provide the reference list prior to contract award if requested.

B. Material Quality:

1. Obtain each product from a single Manufacturer which has manufactured the same product in the United States of America for not less than 5 continuous years.

2. Obtain copper and pre-finished sheet metal items from the same mill run to maintain consistent color hue and surface finish.

C. Pre-Construction Conference: Meet at the project site between one and two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How the building will be kept watertight as work progresses.
2. How sheet metal work will be coordinated with the installation of the vapor barrier, thermal barrier, insulation, cover board, roofing, flashings, roof accessories and other items to provide a watertight installation.
3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.
4. The condition of the substrate, curbs, penetrations and other preparatory work needed.
5. Incomplete submittals; note that progress payments will not be processed until all submittals are received and approved.
6. The construction schedule, weather forecast, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.
7. A schedule for Manufacturer and Architect inspections.

1.6 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work:

1. A pre-work site and building inspection report with photos to document conditions before work starts.
2. 2 foot long samples, for each sheet metal item, to show how it relates and fits on adjoining masonry and wood blocking assemblies, and with the roof, stripping, and flashings.
3. 6 inch square pieces of each type of sheet metal to show surface finish, texture and color.
4. Literature for each type of sheet metal, sealant and fastener.
5. A sample of the Contractor’s guarantee form.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.

1. Submittals shall be prepared and made by the firm that will perform the actual work.
2. Provide electronic submittals on USB drives, in pdf format, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.7 JOB MOCK-UPS

A. After the submittals are approved, prepare in actual job locations, mock-ups of cap and through wall flashings, hook strips, drip edges, fascia, gravel stops, factory fabricated roof edge systems, copings, gutters, leaders, flat and standing seam panels, ridge covers, and all other items of sheet metal and related work, for inspection and approval by the Architect.

B. Construct each mock-up of two full lengths of metal, fastened, connected and stripped-in to the related roofing system, to show the following:

1. Type, gauge, color, cross-sectional dimensions and shape, and joint and mitering techniques.
2. Related masonry work, wood blocking, and the attachment techniques and fasteners for all wood and metal components.

3. Other sheet metal related materials and their installation techniques to fully define the detailing of each mock-up.

C. Mock-ups shall be constructed to establish the minimum standard of materials and workmanship, and to assure that completed work which matches the mock-ups will be fully functional and serve the purpose for it has been designed.

D. Approved mock-ups may be left in place and incorporated into the permanent installation. Rejected mock-ups shall be removed and replaced until an acceptable mock-up is approved.

E. Do not purchase or fabricate sheet metal items until mock-up installation, inspection and approval are completed and approval is documented in writing.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, with intact and legible labels which identify the products and Manufacturers,

B. Cover all stored materials with watertight tarpaulins installed immediately upon delivery.

C. Do not overload the structure when storing materials on the roof.

D. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.9 GUARANTEE

A. Provide a written Contractor's Guarantee which guarantees that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: peeling paint, leakage, adhesive separation, delamination, lifting, loosening, splitting, cracking, and undue expansion.

2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as warranted at his own expense.

3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to affect guaranteed repairs.

4. Guarantee coverage shall have no dollar limit.

5. Guarantee coverage shall take affect no more than 30 days before the completion of all punch list work.

B. Provide one Contractor’s Guarantee that covers “all work performed” when a single contractor is awarded work specified in multiple Sections.

C. The Contractor’s Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor’s Guarantee.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Copper sheet: ASTM B370, 99.0 % pure copper, thickness 16 ounces per square foot.

B. Zinc-Tin coated copper: copper sheet, coated on both sides, with a smooth uniform coating of zinc and tin, base metal weight 16 ounces per square foot, cold rolled temper, commonly known as Freedom Gray Copper by Revere.

C. Solder:

1. 50-50 tin and lead for plain copper, supplied in one pound bars with the alloy mixture stamped into the bar by the Manufacturer.

2. Lead free / or pure tin solder for zinc-tin coated copper, Number 497 by Johnson Manufacturing.

D. Flux:

1. Water-Soluble Liquid Flux, Kester #3345 for iron soldering of brass and copper.
2. Tin-bearing flux such as “Flux-N-Solder E127 with pure tin” by Johnson Manufacturing.

E. Aluminum fascias, hook strips, gravel stops and miscellaneous trim: #3105-H14 alloy aluminum, minimum thickness .050 inches unless otherwise indicated, factory finished with a Fluoropolymer Kynar 500 finish, color as selected by the Architect, from the full range of custom and standard colors.

F. Factory Fabricated Roof Edge System: Extruded aluminum anchor bars secured with #9 stainless steel screws spaced 12 inches on center and .050 inch thick Kynar 500 prefinished aluminum trim covers, independently tested to comply with the ANSI / SPRI ES-1 Wind Design Guide.

G. Fasteners: fabricated of stainless steel, or material that matches the sheet metal being fastened.

H. Underlayment: one ply of high temperature ice & water shield and one ply of 5 pound rosin paper.

I. Leader Boots: 10 foot long hollow rectangular structural steel tube sections, with 1/4 inch thick walls, fabricated with 4 inch high “hubs” welded to the top, sized to match the leaders draining into them.

1. Fabricate the leader boots with welded adapters, to create a smooth water tight transition to the underground drain pipe.
2. Fabricate the leader boots with 3 inch diameter clean out plugs, positioned about 12 inches above grade; by welding half of a typical threaded coupling onto the side of the boot at a 45 degree angle, and install a threaded / removable plug into the coupling.
3. Grind all welds smooth, then shop prime and paint the leader boots with two coats of finish paint prior to installation. Touch up paint minor scratches after installation.

J. Glass Cloth: open mesh glass fabric coated on each side with plasticized asphalt as manufactured by Karnak Corporation or equal.

K. Asphalt cement: Federal Specification SS-C-153B, Type 1, asbestos free grade.

L. Exterior mounted gutters: 7 inch wide, .050 inch thick aluminum seamless, factory finished with Kynar 500 finish, box style gutters (manufactured by Garrety Gutters 800/628-5849) supported with concealed aluminum fascia brackets spaced 12 inches on center fastened with 1-1/2 inch long stainless steel screws.

M. Exterior mounted leaders and straps: .027 inch thick aluminum leaders factory finished with baked acrylic enamel. Fasten each leader with 1/16 inch thick by 1 inch wide straps spaced 7 feet on center.

N. Sealant: High performance, solvent free, formulated and moisture curing silyl-terminated polyether sealant, ASTM C-920, Type S, Grade NS, Class 25, NovaLink construction sealant by ChemLink, color as selected.

O. Metal panels: .032 inch thick V-groove profile interlocking aluminum panels with concealed fasteners, baked acrylic enamel paint finish, color as selected, manufactured by Fabral under the trade name Posi-Lock, or Firestone UnaClad UC-750

P. Hat Sections: nominal 5/8 inch deep 20 gauge galvanized steel sections.

Q. Ice and Water Shield: high temperature 30 mil thick slip resistant buytl based adhesive coated sheet, with a plastic release layer for peel and stick application directly to a prepared roof deck: Grace Ultra.

PART 3 - EXECUTION

3.1 GENERAL

A. Accurately reproduce the details and design shown, and form profiles, bends and intersections, sharp, true and even. Fabricate sheet metal in the shop whenever possible, and form joints, laps, splices and connections to shed water and condensation in the direction of flow.

B. Provide any miscellaneous flashing and sheet metal work not shown on the drawings but otherwise needed to leave the project complete and entirely watertight, neatly and carefully executed in a thorough and workmanlike manner.

3.2 INSPECTION

A. Examine surfaces to receive work of this section and report any defects to the Owner. Commencement of work will be construed as complete acceptance of surfaces.

3.3 INSTALLATION

A. Fabricate and install copper work in accordance with the current edition of "Copper and Common Sense" as published by the Revere Copper and Brass Company, unless otherwise indicated.

1. Form all joints, except loose locked sealant filled expansion joints, to overlap 2 inches.
2. Secure the joints with rivets spaced 1 inch on center positioned about 1/2 inch from the top edge of the joint, then sweat solder the joint.
3. Use solder only to fill and seal the joint, not for mechanical strength. Form soldered joints continuous, strong and free from defects, with well heated soldering irons. Do not use open flame torches for soldering.
4. Clean soldered joints daily, immediately after soldering, by washing them with soap and water applied with a soft bristle brush, then rinsing with clear water.

B. Securely fasten and anchor all work, and make provisions for thermal expansion. Submit details of expansion joints for approval. Install fasteners through one edge of metal only, use a hook strip on the other edge.

C. Use stainless steel pin Zamac type nail-in fasteners, or stainless steel screws and washers with neoprene inserts where fasteners will be exposed.

3.4 CAP FLASHINGS

A. Install new copper cap flashings built into masonry walls properly joined to all related materials in a watertight manner.

1. Solder all joints in the new cap flashing, except form 2 inch wide flat locked sealant filled expansion joints a maximum of 32 feet on center.
2. Form the flashing to turn up 2 inches inside the wall and finish with a hem on the bottom exposed edge.
3. Fasten the top edge of the cap flashing to the back up masonry 12 inches on center.
4. Install the new cap flashing under flexible type wall flashings where possible. Where it is not possible to lap the new cap flashing under an existing wall flashing, install a ply of glass cloth set in and coated with asphalt cement to connect the new cap flashing to the existing wall flashing.
5. In the absence of an existing wall flashing, or at a solid masonry wall, turn up the new cap flashing 2 inches behind the first wythe of masonry.
6. Install new cap flashings where shown on the drawings, and at a height of 10 to 12 inches above the roof surface.

B. Install new aluminum cap flashings on skylight and equipment curbs.

1. Form the cap flashing to extend at least 2 inches under the equipment or skylight, 4 inches over the base flashing, and finish with a 1/2 inch hem on the bottom edge.
2. Install a 1/2 inch thick by 2 inch wide continuous foam gasket between the cap flashing and mechanical equipment or skylight. Do not set the equipment or skylight in sealant.
3. Secure the equipment or skylight to the curb with stainless steel screws spaced 12 inches on center.

3.5 THROUGH WALL FLASHINGS

A. Install new zinc tin coated copper through wall flashings to extend the entire width of the masonry wall, turn down 1 inch with a 3/8 inch hem on the exterior and 4 inches with a 1/2 inch hem on the interior.

1. Skim coat the top of the wall with mortar, to level the wall and create a smooth surface, before installing the through wall flashing.
2. Solder all joints, except form 2 inch wide flat locked sealant filled expansion joints spaced a maximum of 32 feet on center.

B. Install stainless steel dowels 3 inches into the underlying masonry, through the new through wall flashings.

1. Pre-tin the dowels prior to installation.
2. Tightly drive the dowels into drilled holes in the masonry, or set the dowels with epoxy.
3. Position the dowels so that each piece of superimposed masonry will be secured with at least two dowels.
4. Solder the dowels to the through wall flashing to form a watertight seal.

3.6 COPINGS

A. Fabricate new copings to engage a continuous 3/4 inch wide hook strip under the outside face, and fasten the copings with exposed stainless steel screws & washers with neoprene inserts / Zamac type nail-in fasteners, driven through 1 inch diameter stainless steel washers with neoprene inserts spaced 18 inches apart through the inside face 1 inch above the bottom hem.

1. Install 6 inch wide cover plates set into a solid bed of sealant at all joints. Overlap, rivet and install sealant at all miters and special conditions. Form the coping to turn up 6 inches at all rising walls, and cover the turn up with a cap flashing.

3.7 DRIP EDGES

A. Fabricate drip edges to extend 1-1/2 inches past the roof edge, and turn down to ensure water cannot track back and run down the fascia. Secure the drip edge with roofing nails along the top edge, spaced 4 inches apart along the raw metal edge. Form joints in the drip edge with 6 inch wide concealed under plates which duplicate the profile of the drip edge. Set the underplates in a full bed of sealant.

3.8 HOOK STRIPS

A. Form continuous hook strips with locks that engage the superimposed trim piece a minimum of 3/4 inch, and to cover the entire underside edge of the wood blocking and neatly extend to the building wall.

B. Fasten hook strips along their bottom edge, just above the 45 degree bend, with nails spaced 4 inches on center into underlying wood blocking; Zamac type nail-in type fasteners spaced 8 inches on center into masonry surfaces, or screws spaced 8 inches on-center into sheet metal surfaces.

3.9 FASCIA

A. Fabricate new fascia to engage the hook strip 3/4 inch minimum and extend to the top of the wood fascia blocking. Secure the fascia with a continuous hook strip along the bottom edge and roofing nails along the top edge spaced 8 inches apart, positioned to be covered by the roof edge trim. Form joints in the fascia with 6 inch wide concealed under plates which duplicate the profile of the fascia. Set the underplates in a full bed of sealant.

3.10 ROOF EDGE SYSTEM

A. Install a factory fabricated roof edge system on all roof eaves.

1. Extend the roof to lap over and down the face of the fascia trim, so it stops just short of the bottom edge of the anchor bar.
2. Install the anchor bar straight, level and true, set in a full bed of sealant, and secure the bar with #9 by 2 inch long stainless steel screws spaced no more than 12 inches apart.

3. Pre-drill screw holes in the underlying metal fascia trim, where extra fasteners are needed, and at corners and special conditions.
4. Install color matching under plates at each joint in the roof edge trim; set the under plates in a full bed of sealant.

3.11 WALL PANELS

A. Install panels plumb, level, and straight with seams parallel, to achieve the design appearance indicated.

B. Secure the panels with concealed clips fastened with stainless steel screws, placed 12 inches on center in each seam, and with a continuous hook strip along their bottom edge. .

3.12 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage prior to performing any other work on site.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leakage or damage which was not documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

END OF SECTION

Section 07 7200
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings schedules and keynotes, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Roof specialties that are compatible with the roofing systems specified, including:
    a. Plastic skylights
    b. Fiberglass panel skylights
    c. Factory fabricate pipe curb portals
    d. Aluminum smoke vent hatches.
    e. Louvered Penthouse
    f. Galvanized steel roof access ladders and stairs.
    g. Roof walkway pads and concrete pavers.
    h. Snow guard assemblies.

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.
B. Section 04 7200 - Cast Stone Masonry.
C. Section 07 4113 - Metal Roofing
F. Section 07 6200 - Sheet Metal Flashing and Specialties
G. Section 07 7200 - Roof Accessories.
H. Section 09 2662 - Gypsum Sheathing.

1.4 CODE APPROVAL REQUIREMENTS

A. Fabricate and install roof accessories that comply with the NY State Uniform Fire Prevention and Building Code.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with at least 5 continuous years experience performing work similar to that required for this project, employing personnel skilled in the work specified.
    a. The Installer shall directly employ the personnel performing the work of this section.
    b. The Installer shall have a full time supervisor on the roof when work is in progress. The Supervisor shall have a minimum of 5 years experience with work similar in nature and scope to this project, and speak fluent English.
        1. Identify the intended Supervisor, and provide his resume prior to contract award if requested.
2. The Installer shall provide a reference list of at least three previously completed projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:

a. The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number, and the Contractor's Supervisor's name.

b. The Installer shall provide the reference list prior to contract award if requested.

B. Material Quality: Obtain each product from a single Manufacturer which has manufactured the same product in the United States of America for not less than 5 continuous years.

C. Pre-Construction Conference: Meet at the project site between one and two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How the building will be kept watertight as work progresses.
2. How roof accessory work will be coordinated with the installation of the vapor barrier, thermal barrier, insulation, cover board, roofing, flashings, and other items to provide a watertight installation.
3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.
4. The condition of the substrate, curbs, penetrations and other preparatory work needed.
5. Incomplete submittals; note that progress payments will not be processed until all submittals are received and approved.
6. The construction schedule, forecast weather, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.
7. A schedule for Manufacturer and Architect inspections.

1.6 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work:

1. A pre-work site and building inspection report with photos to document conditions before work starts.
2. Manufacturer's installation instructions and technical data sheets for each item. Material sample submittals are not needed unless requested to show color and texture.
3. Samples of the Contractor's and Manufacturer's guarantee/warranty forms.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.

1. Submittals shall be prepared and made by the firm that will perform the actual work.
2. Provide electronic submittals on USB drives, in pdf format, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders for each building.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, with intact and legible labels which identify the products and Manufacturers,

B. Cover all stored materials with watertight tarpaulins installed immediately upon delivery.

C. Do not overload the structure when storing materials on the roof.

D. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.8 GUARANTEE

A. Provide a written Contractor's Guarantee which guarantees that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: peeling paint, leakage, adhesive separation, delamination, lifting, loosening, splitting, cracking, and undue expansion.
2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as warranted at his own expense.
3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to affect guaranteed repairs.
4. Guarantee coverage shall have no dollar limit.
5. Guarantee coverage shall take affect no more than 30 days before the completion of all punch list work.

B. Provide one Contractor’s Guarantee that covers “all work performed” when a single contractor is awarded work specified in multiple Sections.

C. The Contractor’s Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor’s Guarantee.

D. Provide a Manufacturer's written warranty, which warrants the skylights will remain watertight for a minimum 5 year term beginning upon final completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide Manufacturer's standard units, modified as necessary to comply with the specified requirements. Fabricate each unit in a shop to the greatest extent possible, using the following components.

1. Aluminum Sheet: ASTM B 209 alloy 3003, tempered for forming and performance; mill finish, except as otherwise noted.
2. Extruded Aluminum: Standard extrusions alloy 6063-T52; 0.078 inch minimum thicknesses for primary framing and curb member legs, 0.062 inch thickness for secondary framing and covers; mill finish, except as otherwise indicated.
3. Insulation: Rigid fiber glass boards where encapsulated inside metal skirts, rigid isocyanurate where covered with roof flashings on the exterior of curbs.
4. Wood Nailers: Dimension grade Douglas Fir, not less than 1-1/2 inches thick.
5. Fasteners: Nonmagnetic stainless steel or hot dipped galvanized steel, to match the finish of the material being fastened.
6. Gaskets: Tubular neoprene or polyvinyl chloride, or block sponge neoprene.
7. Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

2.2 PLASTIC SKYLIGHTS

A. Factory assembled dome and frame assemblies manufactured by Kingspan / Bristolite or American Skylights are specified to establish a quality standard. Equal products are acceptable provided they comply with the following requirements:

1. Glazing sheet thickness required for a minimum of 30 pounds per square foot external and 30 pounds per square foot internal loading; and to comply with the minimum thickness and wind pressure requirements of AAMA/WDMA/CSA 101/I.S.2/A440 as set forth in paragraph 2405.5 of the NYS Uniform Fire Prevention and Building Code.
2. Outer Dome: Pyramid or Dome shaped Acrylite Heatstop high impact acrylic meeting the following tests:

a. Burn Rate ASTM D635 - Not over 2.5

b. Smoke Developed ASTM D2843

c. Smoke Density Not over 75%

d. Compliance with OSHA fall protection guidelines

3. Inner double wall panel: factory laminated honey-comb sheets meeting the following tests:

a. Burn Rate ASTM D635 - Not over 2.5

b. Smoke Developed ASTM D2843

c. Smoke Density Not over 75%

d. Compliance with OSHA fall protection guidelines.

4. Energy Performance Ratings:

a. Maximum U-factor 0.50

b. Solar Heat Gain Coefficient (SHGC) of 0.40

B. Curb Construction: Provide units with integral internal gutters and weep holes to drain condensation; fabricated with formed and extruded aluminum frames and retaining angles for installation on field constructed curb assemblies.

2.3 FIBERGLASS PANEL SKYLIGHTS

A. Factory fabricated impact resistant panels, 2-3/4 inches thick, formed from glass fiber reinforced thermoset resins and 7/16 inch thick 6063-T6 or 6005-T5 aluminum grid I-beams with thermal breaks, using heat and pressure resin adhesive, butyl sealing tape and stainless steel fasteners.

B. Panels shall deflect no more than 1.9 inches when loaded to 30 psf in a 10 foot span without a supporting frame in accordance with ASTM E72

C. Panels shall have a UL Class A External Fire Rating, a Maximum U-factor 0.50, a Solar Heat Gain Coefficient (SHGC) of 0.40, and meet OSHA 1910.23 Fall Protection Guidelines.

D. Exposed aluminum framing members shall have a Kynar 500 paint finish, color as selected from the full range of Standard and Custom Colors

E. Fiberglass panel colors shall be as selected from the full range of Standard and Custom Colors

F. Basis of design is Kalwall 2-3/4-inch-thick Custom Skylight System with impact resistant panels, equal products from Major Industries or similar glass panel skylights from Kingspan will be accepted if they meet the performance requirements specified.

2.4 LOUVERED PENTHOUSE

A. Factory fabricated penthouse assemblies for mounting on field constructed curbs, incorporating .081 inch thick extruded aluminum louver blades, hidden mullions, 1-1/2 by 1-1/2 by 1/8 inch aluminum angle framing, 18-14 aluminum mesh insect screens, and .050 inch thick aluminum covers, basis of design United Enertech: Model PEL-4-SN Harsh Weather Penthouse, height and blades needed to provide a net free louvered opening equal to the size of the vent opening.

2.5 FACTORY FABRICATED PIPE CURB PORTALS

A. Factory fabricated flashing systems, consisting of 9 inch high internally insulated galvanized steel curbs with 1-1/2 inch square wood nailers at the top edges, and 5 hole EPDM boots, with nipples that will accommodate pipes and conduits from 1/2 to 2-1/2 inches in diameter, with stainless steel hose clamps on each nipple - 5-Hole Pipe Portal Flashing System: C-555, by Portals Plus or equal.

2.6 GALVANIZED STEEL ROOF ACCESS LADDERS AND STAIRS

A. Fabricate ladders from 1-1/4 inch inside diameter steel pipe rails, spaced 22 inches apart, and 3/4 inch solid steel rebar rungs spaced 12 inches on center. Fit the rungs into drilled holes in the centerline of the rails, weld and grind the welds smooth. Extend the ladder rails and form goose-neck returns to finish 42 inches above the roof surface.

1. Hot dip galvanize coat the ladder and mounting brackets after fabrication. Install with Type 316 stainless steel hardware.

B. Fabricate ships ladder stairs from steel C channel stringers, McNichols Serrated Non-Slip Grating Stair Treads and 1-1/4 inch inside diameter steel pipe railings.

1. Use treads formed with 1-1/4 by 3/16 inch bearing bars spaced 1-3/16 inches on center and cross bars spaced 4 inches on center.
2. Weld and grind all welds smooth.
3. Hot dip galvanize the stringer channels, railing and mounting brackets after fabrication. Assemble and install stair assemblies with Type 316 stainless steel hardware.

2.7 ROOF WALKWAY PADS AND CONCRETE PAVERS

A. 2 inches thick, 24 inches by 24 inches precast concrete pavers, natural buff color and finish, minimum 7500 psi compressive strength as manufactured by Hanover Architectural Products.

B. 30 inches by 30 inches hard rubber black walkway pads manufactured by Firestone.

2.8 SNOW GUARD ASSEMBLIES

A. Standing Seam Metal Roofs: Clamp on style 1-1/2 by 2 inch blocks fabricated of aircraft grade aluminum and an extruded rail that accepts custom colored aluminum strip inserts; install with two optional ice flags positioned between the roof seams.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Field measure the roof openings. Comply with manufacturer's instructions and recommendations. Coordinate with the installation of roof deck, other substrates to receive specialty units, vapor barriers, roof insulation, roofing and flashing to ensure that each element of the work performs and fits properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

3.2 PLASTIC SKYLIGHTS

A. Construct an insulated curb to finish 10 inches above the roof surface. Install base and cap flashings, and finish the shaft liner with 5/8 inch gypsum board - taped, primed and painted. Install the skylight on top of a 1/2 inch by 2 inch foam gasket.

3.3 FIBERGLASS PANEL SKYLIGHTS

A. Carefully remove the existing skylights; do not damage the skylight well or shaft finishes.

B. Install the skylight frame and panels using a crew that is experienced and trained to install fiberglass panel skylight systems; in accordance with the approved shop drawings, using stainless steel fasteners.

C. Position the panels straight, in plane, level and true to create an attractive watertight skylight assembly.

D. Remove, discard and replace any components that get damaged as the installation occurs.

E. Carefully wipe the interior and exterior of the skylight clean immediately after the installation is complete.

3.4 FACTORY FABRICATED PIPE CURB PORTALS

A. Install factory fabricated pipe portal flashing systems at all HVAC units, and where more than one pipe or conduit penetrates the roof.

1. Install the portal curbs on wood blocking that matches the thickness of the roof insulation.
   a. Coordinate and install the curbs and boots before the mechanical and electrical contractors run their lines and pipes; so the lines and pipes get properly installed through the curbs and boots.

b. Install water cut off sealant between the lines / pipes and EPDM nipples, and then install a hose clamp on each nipple.

c. Remove and replace nipples that are incorrectly cut too large.

3.5 GALVANIZED STEEL ROOF ACCESS LADDERS

A. Install ladders at the interior and exterior locations shown. Support and secure each ladder at the top and bottom and at intermediate points spaced a maximum of 5 feet on center. Use bolted steel brackets, anchored with 1/2 inch diameter stainless steel epoxy set bolts. Space the ladders to provide 7 inches of toe clearance. Extend the rails 42 inches and goose-neck form them to provide additional support at the top of the ladder.

3.6 ROOF WALKWAY PADS AND CONCRETE PAVERS

1. Install concrete pavers spaced 5 feet on center for conduit supports, and under the duct support legs.
2. Install pavers over a piece of hard rubber walkway pad.

B. Install hard rubber walkway pads to provide a path 2-1/2 feet wide where shown, and at all roof access points, i.e., doors, ladders and hatches, under concrete pavers used for conduit and pipe supports, and around all HVAC equipment.

1. **Adhere each pad with five self adhesive strips - do not install the pads using three strips of tape as supplied by the manufacturer.**

3.7 SNOW GUARD ASSEMBLIES

A. Install clamps on every other seam, in a neat straight line, to position the snow guard assembly above the exterior wall of the building.

B. Tighten the set screws in each clamp using a torque wrench, insert a custom colored strip into the extrusion, and install optional ice flags, fixed into position with a fastener, spaced 8 inches on center.

C. Insert a strip of aluminum trim that matches the roof into the snow guard bars.

D. Install two ice flags uniformly spaced, on each roof panel; i.e., install two flags between the seams.

1. Secure the flags with # 8 self drilling stainless steel screws, so they can’t slide or rotate out of position.

3.8 MISCELLANEOUS

A. Provide and install any sealants needed, where shown or required.

B. Perform mechanical and electrical work using skilled and licensed tradesmen.

C. Provide new material, couplings, transition pieces, blocking, fasteners and the similar accessories needed to complete the work.

3.9 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage, prior to performing any other work on site.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leakage or damage which was not documented in the Contractor’s report, or repaired to the Owners satisfaction at the Contractor’s expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

END OF SECTION

FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Each Contractor shall be responsibly for their own firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not.

B. Multiple Penetrations in Large Openings **by Multiple Trades**:

1. Where indicated special floor opening firestopping shall be be the responsibility of Contract #1 General Construction.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.4 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015.

D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014b.

E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a (Reapproved 2015).

F. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015b, with Editorial Revision (2016).

G. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).

H. ITS (DIR) - Directory of Listed Products; current edition.

I. FM 4991 - Approval Standard for Firestop Contractors; 2013.

J. FM (AG) - FM Approval Guide; current edition.

K. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

L. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.

1.6 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
1. Verification of minimum three years documented experience installing work of this type.

1.7 MOCK-UP

A. Install one firestopping assembly representative of each fire rating design required on project.
1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.

B. If accepted, mock-up will represent minimum standard for the Work.

C. If accepted, mock-up may remain as part of the Work. Removed and replaced mock-ups not accepted.

1.8 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Firestopping Manufacturers:
1. Hilti, Inc: www.us.hilti.com.
2. Substitutions: See Section 01 2500 - Substitution Procedures.

2.2 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

E. Fire Ratings: Refer to drawings for required systems and ratings.

2.3 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.

B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.4 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

A. Gypsum Board Walls:

1. Wall to Wall Joints That Have Movement Capabilities (Dynamic):
   a. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
2. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
   a. 2 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
   b. 2 Hour Construction: UL System HW-D-0184; Hilti CP 606 Flexible Firestop Sealant.
   c. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

2.5 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Penetrations Through Floors or Walls By: **(By single trade)**
   1. Multiple Penetrations in Large Openings:
      a. 1 & 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 & 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:
      a. 1 & 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
   4. Insulated Pipes:
      a. 1 & 2 Hour Construction: UL System C-AJ-5313; Specified Technologies Inc. LC Endothermic Firestop Sealant.
   5. HVAC Ducts, Uninsulated:
      a. 1 & 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.

B. Penetrations Through Floors By: **(By multiple Trades)**
   1. Multiple Penetrations in Large Openings:
      a. 1 & 2 Hour Construction: C-AJ 8207 Fire Block System.

C. Penetrations Through Walls By: **(By single trade)**
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Insulated Pipes:
      a. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   4. HVAC Ducts, Uninsulated:
      a. 1 & 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
   5. HVAC Ducts, Insulated:
      a. 1 & 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.6 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Penetrations By:
   1. Multiple Penetrations in Large Openings:
      a. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   3. Electrical Cables Not In Conduit:
      a. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
   4. Insulated Pipes:
      a. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.
   5. HVAC Ducts, Insulated:
      a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.7 MATERIALS

A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
   1. Manufacturers:
      a. 3M Fire Protection Products: www.3m.com/firestop.
      b. Substitutions: 01 2500 - Substitution Procedures

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.3 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by Port Chester-Rye UFSD's Independent Testing Agency.

C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

D. Install labeling required by code.

3.4 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Port Chester-Rye UFSD, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.5 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Acoustical sealant.

D. Joint backings and accessories.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.

C. Section 07 8400 - Firestopping: Firestopping sealants.

D. Section 07 9513 - Expansion Joint Cover Assemblies: Sealants forming part of expansion joint cover assemblies.

E. Section08 8001 - Glazing: Glazing sealants and accessories.

F. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.4 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).

G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.

6. Sample product warranty.
7. Certification by manufacturer indicating that product complies with specification requirements.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Samples for Verification: Where custom sealant color is specified, obtain directions from Fuller and D'Angelo P.C. and submit at least two physical samples for verification of color of each required sealant.

F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

H. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

I. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
   a. Test date.
   b. Copy of test method documents.
   c. Age of sealant upon date of testing.
   d. Test results, modeled after the sample form in the test method document.
   e. Indicate use of photographic record of test.

E. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
2. Field testing agency's qualifications.
3. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

F. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.

4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Port Chester-Rye UFSD.
6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Fuller and D'Angelo P.C..

G. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inch (457 mm) long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.7 MOCK-UP

A. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution:
1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
1. Bostik Inc: www.bostik-us.com.
2. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
3. Sika Corporation: www.usa-sika.com.
4. W.R. Meadows, Inc: www.wrmeadows.com/sle.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. Sika Corporation: www.usa-sika.com/#sle.
2. W.R. Meadows, Inc: www.wrmeadows.com/#sle.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Wall expansion and control joints.

b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   d. Joints where installation of sealant is specified in another section.
   e. Joints between suspended panel ceilings/grid and walls.

B. Vertical Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

C. Interior Vertical Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.

D. Exterior and Interior Horizontal Joints: Single component, self-leveling, premium-grade polyurethane sealant

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

2.4 NONSAG JOINT SEALANTS

A. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Fuller and D'Angelo P.C. from manufacturer's standard range.
4. Cure Type: Single-component, neutral moisture curing
5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
6. Manufacturers:
   a. Sika Corporation; Sikasil 728NS: www.usa-sika.com/#sle.
   b. Substitutions: 01 2500 - Substitution Procedures

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.
2. Applications: Use for:
   a. Use for all perimeter joints of toilet fixtures, cabinets, casework, countertops and similar locations..
3. Manufacturers:
   a. 786 Mildew Resistant; Dow Corning.
   b. Pecora Corporation; 898 Silicone Sanitary Sealant: www.pecora.com.
   c. Sika Corporation; Sikasil GP: www.usa-sika.com/#sle.
   d. Sanitary 1700; GE Silicones..

4. Substitutions: 01 2500 - Substitution Procedures

C. Type Acoustical Sealant: - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-hardening, non-sagging; not intended for exterior use.
   1. Color: To be selected by Fuller and D'Angelo P.C. from manufacturer's standard range.
   2. Grade: ASTM C834; Grade - Minus 18 Degrees C.
   3. Manufacturers:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant: www.pecora.com.
   4. Applications: Use for:
      a. Use for all interior joints of where acoustical sealant indicated.
   5. Substitutions: 01 2500 - Substitution Procedures

2.5 SELF-LEVELING SEALANTS

A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
   1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
   2. Hardness Range: 0 to 15, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Fuller and D'Angelo P.C. from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
   5. Manufacturers:
      a. Sika Corporation; Sikaflex 1c SL: www.usa-sika.com/#sle.
      b. Use for all horizontal exterior joints and Interior joints in wet areas..
      c. Substitutions: 01 2500 - Substitution Procedures

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
   2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
   3. Open Cell: 40 to 50 percent larger in diameter than joint width. (Not to be used in flat or horizontal joints)
   4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width. (Use for flat and horizontal joints)

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.

2. Notify Fuller and D'Angelo P.C. of date and time that tests will be performed, at least 7 days in advance.
3. Record each test on Preinstallation Adhesion Test Log as indicated.
4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Fuller and D'Angelo P.C..
5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

H. Self-leveling joints: Recess joint depth as recommended by the sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Expansion joint assemblies for floor, wall, corner, ceiling, and soffit surfaces indicated.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: : Expansion and contraction joints in exterior concrete joints.

B. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.

C. Section 07 6200 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

F. UL (DIR) - Online Certifications Directory; Current Edition.

G. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.4 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

B. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Construction Specialties, Inc: www.c-sgroup.com.
   2. Substitutions: 01 2500 - Substitution Procedures

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Floor Joints Subject to Seismic Movement:
   1. Manufacturers:
      a. The C/S Group RFB-200 W/FB100 Floor to Floor.
      b. The C/S RFWB-200 W/FB Floor to Wall Concrete to Masonry.
      c. The C/S Group ASM-200 W/FB Wall to Wall Masonry.
      d. The C/S Group ASM-100 W/FB Wall to Wall, Metal Stud.
      e. The C/S Group FCf-100 Wall to Ceiling

f. The C/S Group ASMC-100 W/FB Corner Masonry.
g. The C/S GroupFWF-200 W W/FB Ceiling
h. The C/S Group SF-200 Exterior Masonry
i. Substitutions: 01 2500 - Substitution Procedures

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
1. Joint Dimensions and Configurations: As indicated on drawings.
2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.

C. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
1. Exposed Finish at Floors: Mill finish or natural anodized.
2. Exposed Finish at Walls and Ceilings: Natural anodized.

B. Resilient Seals:
1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.

C. Anchors and Fasteners: As recommended by cover manufacturer.

D. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.

E. Threaded Fasteners: Aluminum.

F. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

G. Provide joint components in single length wherever practical. Minimize site splicing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.2 PREPARATION

A. Install anchoring devices in conformance to templates.

3.3 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.4 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Fire-rated hollow metal doors and frames.

C. Thermally insulated hollow metal doors with frames.

D. Hollow metal borrowed lites glazing frames.

E. Accessories, including glazing.

1.3 RELATED REQUIREMENTS

A. Section 08 1416 - Flush Wood Doors.

B. Section 08 1613 - Fiberglass Doors and Aluminum Frames.

C. Section 08 3460 - Sound Rated Door and Frame Assembly

D. Section 08 7100 - Finish Hardware.

E. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

F. Section 09 9123 - Interior Painting: Field painting.

1.4 ABBREVIATIONS AND ACRONYMS

A. ANSI - American National Standards Institute.

B. NAAMM - National Association of Architectural Metal Manufacturers.

C. NFPA - National Fire Protection Association.

D. UL - Underwriters Laboratories.

1.5 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

D. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

K. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.

L. UL (DIR) - Online Certifications Directory; Current Edition.

M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

N. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Samples: Submit two samples of metal, 2 inch by 2 inch in size (50 mm by 50 mm in size) showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

G. Manufacturer's Qualification Statement.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Basis of Design: Steelcraft, an Allegion brand 11819 N. Pennsylvania St. Carmel, IN 46032; Toll Free Tel: 877-578-1247: www.allegion.com/us.
2. Assa Abloy Ceco: www.assaabloydss.com.
3. Substitutions: See Section 01 2500 Substitution Procedures.

2.2 DESIGN CRITERIA

A. Requirements for all Doors and Frames:

1. Accessibility: Comply with ICC A117.1 and ADA Standards.
2. Door Top Closures: Flush end closure channel, with top and door faces aligned.
3. Door Edge Profile: Beveled.
4. Typical Door Face Sheets: Flush.
5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   a. Provide 14 gauge channel reinforcing for all door closers.
   b. Provide preparation for all electrical hardware.
7. Galvanizing for Units in Wet Areas including toilets and etc: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS NON EMBOSSED

A. Exterior Doors: Thermally insulated. Provide fire-rated door construction as indicated for Fire-Rated Doors and the following exterior door requirements.
1. Grade: ANSI A250.8 (14 gauge), Level 4, physical performance Level A, Model 2, seamless.
   a. Level 3 - Extra Heavy-duty.
   b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 1 - Full Flush.
   d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
   e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Door Core Material: Polystyrene, 1 lbs/cu ft minimum density.
   a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
4. Weatherstripping: Refer to Section 08 7100.
5. Door Finish: Factory primed and field finished.

B. Interior Doors, Non-Fire Rated:
1. Grade: ANSI A250.8 (16 gauge) Level 3, physical performance Level A, Model 2, seamless, continuous welded. Steel stiffened core construction. Double bevel edges.
2. Core Material: Kraftpaper honeycomb.
   a. STC Rating: 25
3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
4. Door Face Sheets: Flush.
5. Door Finish: Factory primed and field finished.

C. Interior Fire-Rated Doors:
1. Grade: ANSI A250.8 (16 gauge)Level 3, physical performance Level A, Model 2, seamless continuous welded.
   a. Level 2 - Heavy-duty.
   b. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
   a. Temperature-Rise Rating (TRR) Across Door Thickness: 250 degrees F (121 degrees C).
   b. Provide units listed and labeled by UL (DIR).
   c. Attach fire rating label to each fire rated unit.

3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
4. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
5. Door Face Sheets: Flush.
6. Door Finish: Factory primed and field finished.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frames Wider than 48 Inches (1219 mm): Reinforce with steel channel fitted tightly into frame head, flush with top.

C. Exterior Door Frames: Face welded, seamless with joints filled continuously welded.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.
3. Frame Finish: Factory primed and field finished.
4. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum. 14 gauge for opening over 4'-0".
2. Frame Finish: Factory primed and field finished.

E. Door Frames, Fire-Rated: Full profile/continuously welded type.
1. Fire Rating: Same as door, labeled.
2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum. 14 gauge for opening over 4'-0".
3. Frame Finish: Factory primed and field finished.

F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.5 ACCESSORIES

A. Glazing: As specified in Section 08 8000, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Double Doors: Specified in Section 08 7100.

D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

G. Frame Anchors: Minimum of six wall anchors and two base anchors.
1. T anchors for masonry.
2. Clips angles for metal framing.

H. Frame Repairs:
1. Repair dents, patch rust holes, fill in chips etc.
2. Body Filler With Hardener.
3. Color: Light Gray.
4. Manufacturer: 3M Product "Bondo Body Filler 265".

2.6 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

A. Patch existing frames as required to remove rust, dents, chips and fill holes.
   1. Apply body filler in accordance to manufacturer's instruction.
   2. Sand surfaces smooth.

3.3 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door hardware as specified in Section 08 7100.

E. Comply with glazing installation requirements of Section 08 8000.

F. Install perimeter foam seal in accordance with requirements specified in Section 07 9005.
   1. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacture's instructions.
   2. Cut back to permit application of joint sealant.

3.4 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust sound control doors so that seals are fully engaged when door is closed.

END OF SECTION

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated.

1.3 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

B. Section 08 7100 - Finish Hardware.

C. Section 08 8000 - Glazing.

1.4 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

C. ASTM E413 - Classification for Rating Sound Insulation; 2016.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

G. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

H. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

I. WDMA Finish System TR-6, Catalyzed Polyurethane.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
   1. Provide information as required by AWI/AWMAC/WI (AWS).
   2. Include certification program label.

D. Samples: Submit two samples of door construction, 12 by 12 inch (300 by 300 mm) in size cut from top corner of door.

E. Samples: Submit two samples of door veneer, 12 by 12 inch (300 by 300 mm) in size illustrating wood grain, stain color, and sheen.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

G. Test Reports: Show compliance with specified requirements for the following:

H. Manufacturer's Installation Instructions: Indicate special installation instructions.

I. Cleaning Instructions: Submit manufacturer’s cleaning instructions for doors.

J. Manufacturer’s Certification: Submit manufacturer’s certification that doors comply with specified requirements and are suitable for intended application.

K. Specimen warranty.

L. Warranty, executed in Port Chester-Rye UFSD's name.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than ten (10) years of documented experience.
   1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

C. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

D. Fire-Rated Doors: Labeled by Intertek/Warnock Hersey.
   1. Construction Details and Hardware Application: Approved by labeling agency.

E. Positive Pressure Opening Assemblies: UL 10C.

F. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire-rating as indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

D. Store doors in accordance with manufacturer’s instructions.

E. Store doors in clean, dry area indoors, protected from damage and direct sunlight.

F. Store doors flat on level surface.

G. Do not store doors directly on concrete.

H. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.

I. Store doors between 50 and 90 degrees F (10 and 32 degrees C) and 30 to 50 percent relative humidity.

J. Handle doors in accordance with manufacturer’s instructions.

K. Protect doors and finish during handling and installation to prevent damage.

L. Handle doors with clean hands or clean gloves.

M. Lift and carry doors. Do not drag doors across other doors or surfaces.

1.8 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

B. Do not subject doors to extreme conditions or changes in temperature or relative humidity in accordance with WDMA I.S.1-A.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
2. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Veneer Faced Doors:
1. VT Industries, Inc., 1000 Industrial Park, PO Box 490, Holstein, Iowa 51025. Toll Free (800) 827-1615. Phone (712) 368-4381. Fax (712) 368-4111. www.vtindustries.com. door_info@vtindustries.com..
2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 DOORS

A. Doors: Refer to drawings for locations and additional requirements.
1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
1. Provide solid core doors at each location .
2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
3. Wood veneer facing with factory transparent finish as selected by the Architect.

2.3 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 and 45 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.

B. Fire-Rated Doors: Fire Rating over 45 minute, Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
1. Vertical Edges: Same species as face veneer.
2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.

2.5 ACCESSORIES

A. Glazing: As specified in Section 08 8000.

2.6 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
1. Core: Incombustible mineral core for fire rated doors.
2. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
3. Provide solid blocking for other throughbolted hardware.

C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.

D. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated:
   1. 5-inch top-rail blocking.
   2. 5-inch blocking in doors provided with locks
   3. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
   4. 5-inch midrail blocking, in doors indicated to have exit devices.
   5. Beveled meeting stiles.
   6. Top Rail: 1-1/2" Firestop™.
   7. Vertical Stiles: 1" Firestop™ with matching hardwood edge. Conceal crossbands at edge.
   8. Vision Lite: VT1F noncombustible.

E. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

H. Provide edge clearances in accordance with the quality standard specified.

2.7 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
   1. Transparent:
      a. System - TR-8, UV Cured Acrylated Polyester/Urethane.
      b. Stain: As selected by Fuller and D'Angelo P.C..
      c. Sealer: 3 coats.
      d. Sanding: Sand.
      e. Topcoat: 2 coats.
      f. Sheen: Flat.

2.8 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08 1113.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Door Hardware: As specified in Section 08 7100.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 PREPARATION

A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Install door hardware as specified in Section 08 7100.

D. Use machine tools to cut or drill for hardware.

E. Coordinate installation of doors with installation of frames and hardware.

F. Coordinate installation of glazing.

3.4 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.5 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.6 SCHEDULE - See Drawings

END OF SECTION

FIBERGLASS DOORS AND ALUMINUM FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Fiberglass reinforced polyester (FRP) doors.

B. Aluminum monumental stile and rail doors

C. Aluminum Frames for fiberglass reinforced polyester doors.

D. Thermal Break Aluminum Frames.

E. Snap trim.

F. Factory installed Finish Hardware

G. Insulated Infill panels.

H. Foam door seal.

I. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 08 1213 - Hollow Metal Frames: Metal frames.

B. Section08 7100 - Door Hardware.

C. Section 08 4313 - Aluminum-Framed Entrances and Storefront.

D. Section 08 4413 - Glazed Aluminum Curtain Walls.

E. Section 08 8000 - Glazing.

1.4 REFERENCE STANDARDS

A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents

D. ASTM D 570 - Water Absorption of Plastics

E. ASTM D 638 - Tensile Properties of Plastics

F. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

G. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics

H. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

I. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging

J. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor

K. ASTM D 5420 – Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.

L. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products

M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

N. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).

O. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

Q. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

R. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

S. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

T. ASTM F 476 - Security of Swinging Door Assemblies.

U. ASTM F 1642-04 - Standard Test Method for Glazing Systems Subject to Air blast Loading.

V. NWWDA T.M. 7-90 - Cycle Slam Test Method

W. SFBC PA 201 - Impact Test Procedures.

X. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

Y. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

Z. NFPA 252 - Fire Tests of Door Assemblies.

AA. UBC Standard 7-2 - Fire Tests of Door Assemblies.

AB. UL 10C - Positive Pressure Fire Tests of Door Assemblies

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

B. Air Infiltration: For a single door 3’-0” x 7’-0”, test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.27 psf. Door shall not exceed 0.58 cfm/ft2.

C. Water Resistance: For a single door 3’-0” x 7’-0”, test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.

D. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.

E. Hurricane Test Standards, Single Door:
   1. Uniform Static Load, ASTM E 330: Plus or minus 195 pounds per square foot.
   2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
   3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
   4. Large Missile Impact Test, SFBC PA 201: Passed.

F. Hurricane Test Standards, Pair of Doors with single point latching:
   1. Uniform Static Load, ASTM E 330: Plus or minus 112.5 pounds per square foot.
   2. Forced Entry Test, 300 Pound Load Applied, AAMA 1304: Passed.
   3. Cyclic Load Test, ASTM E 1886: Plus or minus 75 pounds per square foot.
   4. Large Missile Impact Test, ASTM E 1886: Passed.

G. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.

H. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.

I. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.

J. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.

K. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.

L. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
   1. Flame Spread: Maximum of 25.
   2. Smoke Developed: Maximum of 450.

M. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 14.0 foot-pounds per inch of notch.

N. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 13,000 psi.

O. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.

P. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.

Q. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.

R. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.

S. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.

T. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.

U. Chemical Resistance, ASTM D 543. Excellent rating.
   1. Acetic acid, Concentrated.
   2. Ammonium Hydroxide, Concentrated.
   3. Citric Acid, 10%.
   4. Formaldehyde.
   5. Hydrochloric Acid, 10%
   6. Sodium hypochlorite, 4 to 6 percent solution.

V. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.

W. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.

X. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.

Y. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

Z. UL 10C

1.6 SYSTEM PERFORMANCE:

A. Provide Door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.

B. Thermal Transmission (Exterior Doors): U-value of not more than 0.09 (BTU/Hr. x sf x degrees F.) per AAMA 1503.1.

C. Ignition Barrier: Doors not requiring a fire resistance rating shall comply with the requirements of IBC-2015 Section 2603.4.1.7. Foam plastic insulation shall have a flame spread index of 75 or less and a smoke-developed index of not more than 450. Door facings shall have a minimum thickness of 0.032" (0.8mm) aluminum sheet or steel having a base metal thickness of not less than 0.016" (0.4mm) at any point. Manufacturer may alternatively submit an evaluation and testing report from an acceptable agency, confirming testing, accordance with 2603.9, has been completed indicating compliance.

D. Thermal Barrier: Insulated panels shall conform to the requirements of IBC-2015 2603.4. Foam plastic shall be separated from the interior of a building by an approved thermal barrier of 0.5-inch (12.7 mm) gypsum wallboard or equivalent thermal barrier material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.

C. Test Reports: Show compliance with specified criteria.

D. Shop Drawings: Show layout and profiles; include assembly methods. Shop drawings to be prepared by door manufacturer.

1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
2. Indicate wall conditions, door and frame elevations, at 1/2" scale, half-sized detail sections, materials, gages, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on Drawings to identify details and openings. expansion provisions, and other components not included in the manufacturer's standard data. Include glazing details

E. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.

1. Where normal color and texture variations are expected, include two or more units in each sample to show the range of such variations.

F. Architect reserves the right to require samples of typical fabricated section, showing joints, exposed fastenings (if any), quality of workmanship, hardware and accessory items, before fabrication of the work proceeds.

G. Door Corner Sample: Submit corner cross sections, 10 inch (254 mm) by 10 inch (254 mm) in size, illustrating construction, finish, color, and texture.

H. Manufacturer's Qualification Statement.

I. Maintenance Data: Include instructions for repair of minor scratches and damage.

J. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer; include detailed terms of warranty.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than ten years of documented experience.

1. Door and frame components from same manufacturer.
2. Evidence of a compliant documented quality management system.

B. Standards: Comply with the requirements and recommendations in applicable specifications and standards by NAAMM, AAMA, and AA, including the terminology definitions, and specifically including the "Entrance Manual" by NAAMM, except to the extent more stringent requirements are indicated.

C. All materials, equipment and operation supplied shall conform to all Code requirements including Accessibility for the Handicapped.

D. Installer Qualifications: Company specializing in installing products of the type specified in this section with not less than five (5) years of documented experience, and approved by the manufacturer..

E. The manufacturer shall provide a factory trained technician to visit this project and instruct the installers in the proper installation of the door and frame assemblies.

1.10 FIELD MEASUREMENT:

A. Verify field measurements prior to fabrication of doors and frames to insure proper fitting of assemblies. Successful bidders are expected to field verify all dimensions, sizes, quantities and the material required to complete this project. Failure to do so will not relieve the successful contractor from the necessity of furnishing any and all materials that my be required, without any additional costs to the Owner.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Mark doors with location of installation, door type, color, and weight.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Materials shall be inspected for damage, and the manufacturer shall be advised immediately of any discrepancies. Unsatisfactory materials are not to be used

C. Handling: Protect materials and finish from damage during handling and installation.

D. Store materials in original corrugated packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.

1. Doors shall be "floated" within cartons, with no portion of the door having contact with the outer shell of the container.
2. Store at temperature and humidity conditions recommended by manufacturer.
3. Do not use non-vented plastic or canvas shelters.
4. Immediately remove wet wrappers.
5. Store in position recommended by manufacturer, elevated minimum 4 inch (102 mm) above grade, with minimum 1/4 inch (6.4 mm) space between doors.

1.12 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Special Project Warranty:

1. Provide a written warranty signed by Manufacturer, Installer and Contractor, agreeing to replace, at no cost to the Owner, any doors or frames that fail in materials or workmanship, within the time period of acceptance, as indicated below. Failure of materials or workmanship includes excessive deflection, faulty operation of entrances, deterioration of finish, or construction, in excess of normal weathering, and defects in hardware, weather stripping, and other components of the work. In addition the manufacturer further certifies that they have factory installed all hardware and such hardware is also guaranteed not to come loose during the guarantee period.
2. Warranty Time Period: Ten Years from substantial completion.
3. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure due to corrosion on FRP components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.

2.2 ALUMINUM DOOR FRAMES

A. General:

1. Materials and Accessories
   a. Aluminum Members: Provide 6063-T5, alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate, with a minimum wall thickness of 0.125".

b. All materials shall be of the same manufacturer. No splitting of Door and Frame components will be permitted for aluminum frames.
c. Fasteners: Provide Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors, and other items being fastened. For exposed fasteners (if any), provide Phillips head flat head screws with finish matching the item to be fastened.
d. Do not use exposed fasteners, except where unavoidable for the assembly of units, or unavoidable for the fastening of hardware. Provide only concealed screws in glazing stops.
e. Reinforcement and Brackets: Manufacturer's standard formed or fabricated steel units, of shapes, plates, of bars, with 2.0 ounce hot-dip zinc coating, complying with ASTM A 123, applied after fabrication.
f. Expansion Anchor Devices: Lead shield or toothed steel, drilling expansion bolt anchors.
g. Bituminous Coating: Cold applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
h. Sealants and Gaskets: Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproof.
i. Hardware:
    a) Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
    b) Factory install door hardware.
j. Anchors:
    a) Anchors appropriate for wall conditions to anchor framing to wall materials.
    b) Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
    c) Secure head and sill members of transom, side lites, and similar conditions.
k. Applied Door Stops:
    a) 0.625-inch high, with screws and weatherstripping.
l. Pressure gasketing for weathering seal.
m. Counter punch fastener holes in door stop to preserve full-metal thickness under fastener head.
n. Caulking: Caulk joints before assembling frame members.
o. Joints:
    a) Secure joints with fasteners.
    b) Provide hairline butt joint appearance.
p. Open-back framing is not acceptable.

B. Aluminum Door Frames (Non-Rated)
1. Tubular Framing:
2. Perimeter Frame Members:
    a. Box type with 4 enclosed sides.
    b. Size: 2" x 6".
    c. Factory fabricated.
    d. Open-back framing is not acceptable.

C. Thermally Broken Aluminum Storefront Framing:
1. Model: SL-600TB, Special-Lite, Inc
2. Size and Type: As indicated on the Drawings.
3. Profiles: 5-3/4 inch (146 mm) deep, 2 inch (51 mm) wide at jambs, and 2 inch (51 mm) wide at headers.
4. Perimeter Frame Members:

a. Thermally broken pocket filler.
b. Factory fabricated by frame manufacturer.
c. Jambs, Mullions, Sills, Horizontal Intermediates, and Headers: 0.080-inch wall thickness.
d. Lock Jambs, Hinge Jambs, and Door Headers: 0.125-inch wall thickness.

2.3 MONUMENTAL WIDE STILE ALUMINUM DOORS

A. Model: SL-15 wide stile doors wide stile monumental aluminum stile and rail doors.

B. Door Opening Size: As indicated on the Drawings.

C. Door Thickness: 1-3/4 inches.

D. Stiles and Rails:
1. Material: Aluminum Alloy 6063-T5 tubular extrusions, 0.125-inch minimum wall thickness, 1-piece.
2. Stile Width: 4-3/4 inches.
3. Rails:
a. Top: 6-1/2 inches.
b. Bottom: 10 inches.
c. Screw or snap in place applied caps are not acceptable.
d. Meeting stiles to include integral pocket to accept pile brush weather seal.
e. Integral glass stops on exterior side, no snap or applied stops allowed.

E. Corners:
1. True mortise and tenon joints.
2. Full-width 3/8-inch diameter galvanized steel tie rods secured with locking hex nuts.
3. Weld, glue, or other methods of corner joinery are not acceptable.

F. Welding of Joints: Not permitted.

G. Mid Panel:
1. Model SL-484.
2. 12” high.
3. Core.
a. Poured-in-place polyurethane foam.
b. Laid in foam cores are not acceptable.
c. Foam Plastic Insulated Doors: IBC 2603.4.
a) Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
b) Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.
c) IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032” aluminum or 0.016” steel.
d) Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have a thermal barrier.
d. Frame.
a) Aluminum extrusions with extruded spline and interlocking edges to secure face sheet.
e. Secured to stiles with mortise & tenon joints and two 3/8” steel tie rods with locking hex nuts.

H. Fasteners:

1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
2. Compatibility: Compatible with items to be fastened.
3. Exposed Fasteners: Oval Phillips head screws with finish matching items to be fastened.

I. Hardware.
1. Pre-machine doors in accordance with templates from specified hardware manufacturers.
2. Surface mounted closures will be reinforced for but not prepped or installed at factory.
3. Factory install door hardware.

J. Reinforcements.
1. Aluminum extrusions made from 6061 or 6063 aluminum alloys.
2. Sheet and plate to conform to ASTM-B209.
3. Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.
4. Bars and tubes to meet ASTM-B221.

K. Performance.
1. Door and Thermally Broken Aluminum Frame Assembly.
a. Thermal Transmittance, NFRC 100.
a) Commercially Glazed Swinging Entrance Door (> than 50% glass)
(a) U-Factor = 0.62 Btu/hr?ft²?°F.
b. Air Leakage, NFRC 400, ASTM-E283.
a) Commercially Glazed Swinging Entrance Door (> than 50% glass)
(a) 0.39 cfm/sqft @ 1.57 psf.
(b) 0.78 cfm/sqft @ 6.24 psf.
c. Sound Transmission, ASTM-E90: STC = 30, OITC = 28

2.4 FIBERGLASS REINFORCED POLYESTER (FRP) DOORS:

A. Doors are to be constructed as follows:
1. Model S-17, 1 3/4" thick.
2. Constructed of aluminum alloy rails and stiles, joined with steel tie rods.
3. Stiles to be tubular shape to accept hardware as specified.
4. Top and bottom rails to be extruded with legs for interlocking "rigidity weather bar."
5. Joinery to be 3/8" tie rods, top and bottom, bolted through an extruded spline and 3/16" riveted reinforcing angles, and secured with aircraft type nuts. Doors with mid-panels are to have an additional tie rod at the mid-panel.

B. All doors shall be pre-machined in accordance with templates from the hardware manufacturer. For surface applied hardware doors shall have necessary reinforcement, including the attachment of RIVNUT blind bolt fasteners. With the exception of door closures and holders, which require field applications, doors are to be shipped with hardware attached.

C. Face sheets to be locked in with extruded interlocking edges. (No Snap-On trim will be accepted.)

D. Core is to be of Urethane foam of 5 lb. per cubic foot density. All doors are to be properly reinforced for hardware prior to Urethane core foaming in door.

E. Face sheets for FRP Doors are to be .120" thick..
1. Class A for all interior doors and interior face of exterior doors.

F. Cutouts:
1. Manufacture doors with cutouts for required vision lites and louvers.
2. Factory install vision lites and louvers.

G. Hardware:

1. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

H. Fasteners:
1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
2. Compatibility: Compatible with items to be fastened

I. Color as selected by the Architect from Manufactures Standard or Classic Colors. Interior and exterior colors may be different.

2.5 INSULATED INFILL PANELS

A. Insulated Infill Panels: IP-1 Aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
1. Thickness: 3" or as indicated.
2. Exterior Skin: Porcelain on Aluminum 0.04 inch (1.0 mm) thick.
3. Insulation Core: Isocyanurate 1.7-lb density Isocyanurate insulation core with R value of 18.56.
4. Exterior Substrate: 3/16" hardboard.
5. Interior Substrate: 1/2" Fire code gypsum
6. Interior Skin: Aluminum 0.040 inch (1 mm) thick.
7. Exterior Finish: Smooth custom Kynar high performance organic coating .
8. Interior Finish: Smooth custom Kynar high performance organic coating.
9. Warranty: 25 years.
10. Product: "Mapestop" as manufactured by Mapes Architectural Panels; sales@mapes.com / www.mapespanels.com

2.6 FINISH HARDWARE:

A. Provide and factory install finish hardware for each door leaf as specified in Division 8 “Finish Hardware”.

B. SL-82 Class I Aluminum Recessed Pull Handles. Color selected by Architect.

C. Receive Hardware supplied in accordance with this Section, and coordinate with additional Hardware requirements of Section 08 7100. Report discrepancies (in writing) to the Architect immediately.

D. Reinforce, cut, drill and tap doors and frames as required to receive Hardware, except do not drill and tap for surface mounted closers and holders, which will be applied at the jobsite. Comply with Hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
1. Reinforcement:
a. Stile Edge: 1" High density mineral, FRP Edge Banding.
b. Top Rail: 6” High density mineral.
c. Bottom Rail: 2" High density mineral.

E. Install all Hardware, except surface mounted closers and holders, at the fabrication plant. Remove only Hardware as required for final finishing or delivery to jobsite. Package and identify such Hardware and ship with doors and frames for installation at the project site.

F. Painting: All existing surfaces to remain exposed, and all disturbed areas shall be painted to match existing surfaces.

G. Hinge and hardware fasteners Stainless steel Type 304

2.7 FABRICATION:

A. Sizes and Profiles: The required sizes for door and frame units, and profiles requirements are shown on the drawings.

B. The details shown are based upon standard details by one or more manufacturers. It is intended that similar details by other manufacturers will be accepted, provided they comply with size requirements, and with minimum/maximum profile requirements as shown.

C. Co-ordination of Fabrication: Check the actual frame or door openings in the construction work by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress, as directed by Contractor, and avoid delays of the work.

D. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to the cleaning, finishing, treatment and application for coatings. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".

E. No Welding of joints will be accepted.

F. Conceal fasteners, wherever possible, except as otherwise noted.

G. Maintain continuity of line and accurate relation of planes and angles. Provide secure attachments and support at mechanical joints, with hairline fit at contacting members.

H. Reinforce the work as necessary for performance requirements, and for support to the structure. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion. Separate metal surfaces at moving joints with non-metallic separators to prevent "freeze-up" of joints.

2.8 FINISHES

A. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 50% polyvinylfluoride resin by weight; complying with AAMA 2604.
2. Color: As selected by Architect from manufacturer's standard colors.

2.9 ACCESSORIES

A. Foam window and door seal.

1. Fill all exterior joint between windows and doors solid in accordance with manufacture's instructions.
2. Cut back to permit application of joint sealant.
3. Insulating-Foam Sealant: Dow Great Stuff Window & Door.

B. Snap Trim as required. Match door and frame finish.

C. Glazing: As specified in Section 08 8000.

D. Lite Kits:

1. Provide and factory install a Special-Lite FL-Series 2 piece extruded aluminum Class I Clear Anodized Lite Kit. Provide as per the drawings.
2. Size as indicated on drawings.
3. Factory Glazing: Refer to Section 08 8000 - Glazing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.

B. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

A. Remove existing doors and frames, and dispose of all removed materials in accordance with local authorities having jurisdiction.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean and prepare substrate in accordance with manufacturer's directions.

D. Protect adjacent work and finish surfaces from damage during installation.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.

B. Install exterior doors in accordance with ASTM E2112.

C. Set units plumb, level, and true-to-line, without warping or racking doors or frames, and with specified clearances; anchor securely in place.

D. Set thresholds in continuous bed of sealant.

E. Install perimeter sealant in accordance with requirements specified in Section 07 9005.
   1. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacture's instructions.
   2. Cut back to permit application of joint sealant.

F. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

G. Repair or replace damaged installed products.

3.4 ADJUSTING

A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.

B. Adjust hardware for smooth and quiet operation.

C. Adjust doors to fit snugly and close without sticking or binding.

3.5 CLEANING

A. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

C. Provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.

END OF SECTION

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Access door and frame units, fire-rated and non-fire-rated, in wall and ceiling locations.

1.3 RESPONIBILITY AND REQUIREMENTS

A. Each Contractor shall provided access doors for all dampers, valves, cleanest, junction boxes, pull boxes or similar items located above finished ceilings or ceiling breaks or extensions, behind finished walls or below finished floors. The access doors shall be steel, unless noted otherwise, hinged types as required for type of construction.
   1. Where feasible locate all dampers, valves, cleanest, junction boxes, pull boxes or similar items above acoustical panel tile ceilings.

B. In new walls, floor, ceiling, etc., access doors are to be installed by the General Construction Contractor and furnished by each Contractor whose work requires access.

C. Access door required in existing walls, floors, ceilings, etc., shall be furnished and installed by the contractor requiring access.

1.4 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Openings in partitions.

B. Section 09 9123 - Interior Painting: Field paint finish.

C. Divisions 22, 23 and 26: Mechanical/ Electrical components requiring access.

1.5 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.

C. 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; 2017.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

E. ITS (DIR) - Directory of Listed Products; current edition.

F. UL (FRD) - Fire Resistance Directory; Current Edition.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

D. Samples: When requested, submit two access units, 12 x 12 inch (300 x 300 mm) in size illustrating frame configuration.

E. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

F. Project Record Documents: Record actual locations of each access unit.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS ASSEMBLIES

A. General:
1. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
2. Sizes shall be 12 X 12 inch at easily accessible valves and cleanouts; 18 X 18 inch where partial body access is required; 24 X 24 inch where entree body access is necessary.
3. Group together concealed boxes, control valves, dampers and other mechanical and electrical equipment requiring access for operation, maintenance and repair, to reduce number of access doors required.
4. Where electric motors or heaters are installed above hung ceilings, provide disconnect switch in hung ceilings within reach from access doors, unless switch is located on wall immediately below.
   a. Disconnect switch shall be provided and installed by the Contractor furnishing the equipment unless shown otherwise.
5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
6. All access doors shall have integral casing bead, white enamel prime coat, reinforced panel, flush type tamper proof lock unless noted otherwise.
7. All access doors in Toilets, Janitor Closets, Science and Prep Rooms, Storage Rooms, and Kitchen and Food Related Areas and similar spaces shall be watertight and constructed completely of stainless steel type 304.

B. Wall-Mounted Units:
1. Material: Steel.
2. Sizes shall be 12 X 12 inch at easily accessible valves and cleanouts; 18 X 18 inch where partial body access is required; 24 X 24 inch where entree body access is necessary.
3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
4. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
5. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

C. Wall-Mounted Units in Wet Areas:
1. Material: Stainless steel, Type 304.
2. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
3. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

D. Fire-Rated Wall-Mounted Units:
1. Wall Fire-Rating: Fire rating equivalent to the fire rated assembly in which they are to be installed..
2. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.
3. Material: Steel.
4. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.

E. Ceiling-Mounted Units:
1. Material: Steel.
2. Size - Lay-In Grid Ceilings: To match module of ceiling grid.

F. Fire-Rated Ceiling-Mounted Units:
   1. Ceiling Fire-Rating: As indicated on drawings.
   2. Material: Steel.

2.2 MANUFACTURERS

A. Wall and Ceiling Access Doors:
   1. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
   2. Substitutions: Section 01 2500 Substitution Procedures .

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

COILING COUNTER DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Non-fire-rated coiling counter doors and operating hardware.

B. Operation: Manual.

C. Countertop.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Rough openings.

B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 09 2116 - Gypsum Board Assemblies: Rough openings.

1.4 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish.

C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.

D. Samples: Submit two slats, 4 inch long (102 mm long), illustrating shape, color and finish texture.

E. Manufacturer's Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.

F. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

G. Certificate stating that installed materials comply with this specification.

H. Provide manufacturer ISO 9001:2008 registration

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001:2008 registered and a minimum of five years experience in producing counter doors of the type specified.

B. Installer Qualifications: Minimum of three years experience in installing counter doors of the type specified an approved by the manufacturer’s.

1.7 DELIVERY STORAGE AND HANDLING

A. Provide manufacturer’s instructions for delivery, handling and storage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Coiling Counter Doors:

1. Model ESC - 10 as manufactured by Cornell: 24 Elmwood Avenue, Mountain Top, PA 18707. Telephone: (800) 233-8366.
2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 COILING COUNTER DOORS

A. Coiling Counter Doors, Non-Fire-Rated: Galvanized steel slat curtain.
   1. Interlocked flat-faced slats, 1-1/2 inches (38 mm) high by 1/2 inch (13 mm) deep, minimum 22 gauge ASTM A 653, Commercial Quality, with extruded tubular aluminum bottom bar with continuous lift handle and vinyl astragal.
   2. Mounting: As indicated on drawings.
   3. Provide integral frame and sill of same material and finish.
   4. Manual push up operation.
   5. Locking Devices: Slide bolt on inside.

2.3 MATERIALS

A. Curtain Construction: Interlocking, single thickness slats.
   1. Slat Ends: Alternate slats fitted with end locks, high strength molded nylon endlocks riveted to ends to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with tube to provide reinforcement and positive contact in closed position.

B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
   1. Aluminum: Heavy duty extruded aluminum sections with snap-on cover to conceal fasteners. Provide polypropylene pile runners on both sides of curtain to eliminate metal to metal contact between guides and curtain.

C. Brackets:
   1. Fabricate from reinforced steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures.

D. Finish:
   1. Standard (Stock Colors): Zirconium treatment followed by a [gray] [tan] [white] baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness
   2. SpectraShield® Coating System (Color Selected by Architect): Zirconium treatment followed by baked-on polyester powder coat, [color as selected by Architect from manufacturer's standard color range, over 180 colors] [custom color as selected by Architect]; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better
   3. Atmoshield® Powder Coating System (Color Selected by Architect):
      a. ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding, gray baked-on base coat and gray baked-on polyester finish coat
      b. Hot-dip Galvanized: ASTM A 123, Grade 85 zinc coating, hot-dip galvanized

E. Roller Shaft Counterbalance:
   1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.
   2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

F. Hood:
   1. Minimum [24 gauge galvanized steel] [24 gauge stainless steel] [0.040 inch (1.016 mm) aluminum] with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets.
   2. Finish:
   1. Atmoshield® Powder Coating System (Color Selected by Architect):

G. Manual Operation:
   1. Push-Up: Manual lift or pole with hook

2.4 ACCESSORIES

A. Locking:
   1. Padlockable slide bolt: Padlockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides.
      a. Provide interlock switches on motor operated units.
   2. Countertop:
      a. Stainless steel 14 gauge type 304 #4 finish:
         a) Rectangular shape design for between jambs mounted unit of size and configuration for opening size and wall construction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

B. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings

C. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates

D. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install perimeter trim as indicated.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch (1.5 mm).

C. Maximum Variation From Level: 1/16 inch (1.5 mm).

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft (3 mm per 3 m) straight edge.

3.4 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation , free from warp, twist, or distortion.

3.5 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

C. B. Remove surplus materials and debris from the site

3.6 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative

B. Instruct Owner's Representative in maintenance procedures

END OF SECTION

SOUND RATED DOOR AND FRAME ASSEMBLY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide sound rated door and frame assemblies where shown on the drawings, as specified herein, and as shown on the door schedule.

B. The work includes door and frame assemblies complete with acoustical seals, hinges, glazing, and finish hardware - such as locksets, panic devices, and door closers.

1.3 RELATED WORK

A. Section 08 7100 - Door Hardware.

B. Section 09 2116 - Gypsum Board Assemblies.

C. Section 09 9123 - Interior Painting

1.4 REFERENCE STANDARDS

A. References:

1. ASTM A366: Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
2. ASTM A1011: Standard Specification for Steel, Hot-Rolled Sheet and Strip, Commercial.
3. ASTM A653: Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron alloy Coated (Galvannealed) by the Hot Dipped Process.
4. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss in Building Partitions.
5. ASTM E336: Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
6. ASTM E413: Classification for Determination of Sound Transmission Class
7. UL10B: Fire Tests of Door Assemblies.
8. UL10C: Positive Pressure Fire Tests of Door Assemblies.
9. UBC7-2: Fire Tests of Door Assemblies.
10. NFPA 80: Standard for Fire Doors and Fire Windows
    a. HMMA 840: Installation and Storage of Hollow Metal Doors and Frames.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

B. Guarantee all material furnished and installed under this section to be free from defects in material and workmanship for a period of one year from substantial completion of the project.

C. All work of this section shall be furnished by a single manufacturer experienced in the manufacture of sound rated door and frame assemblies for at least five years.

1.6 SUBMITTALS

A. Schedule of items to be provided under this section.

B. Manufacturer’s specifications and other product data needed to demonstrate compliance with these specifications.

C. Shop drawings showing details of each frame type, including profiles, gauges, reinforcing, and anchorage devices for securing to adjacent materials; door types, sizes, swings, hardware and sound seals; operating dimensions, elevations, and cross-sections of doors and sound seals; and cutout details.

D. Certified test reports indicating that the acoustical performance of the door assemblies meets the STC (Sound Transmission Class) performance as called out on the door schedule. Testing shall have been conducted in accordance with ASTM E90-90 or later and rated in accordance with ASTM E413 by an accredited independent acoustical laboratory that is a member of NVLAP (National Volunteer Laboratory Accreditation Program). Reports shall be submitted on single and pairs of doors and frames identical to the type to be supplied.

E. Test reports by an independent Acoustical Engineer certifying a Field Sound Transmission Class (FSTC) or Noise Isolation Class (NIC), in conformance with the requirements of test method ASTM E336-84, performance of no more than five points below the laboratory STC performance on similar installations.
   1. If required, certify that the assemblies have been tested in accordance with Standard for Safety UL 10b for neutral pressure requirements or Standard for Safety UL10C/UBC7- 2 for positive pressure requirements of labeled fire doors and frames, and meet the applicable requirements of NFPA 80.
   2. Manufacturer's recommended installation procedures which, when approved by the architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
   3. Written guarantee as specified above.

F. Notification of work completion: After installation and prior to acceptance testing, provide a letter to the Construction Manager and the Project Acoustic Consultant, co-signed by the general contractor's project representative, indicating that all Sound Control Door assemblies have been installed and gaskets have been adjusted to form an airtight seal around the full perimeter of each door panel.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store steel doors and frames in accordance with requirements of HMMA 840.

B. Remove wraps or covers from doors and frames upon delivery at the building site; promptly clean and touch-up scratches or disfigurement caused by shipping or handling with rust inhibitive primer. Minor damages may be repaired provided the items are equal in all respects to new work and acceptable to the architect and owner; otherwise, replace damaged items as directed.
   1. Store units on planks or dunnage in a dry location; store doors in a vertical position spaced by blocking.

C. Store units covered to protect them from damage, but permitting air circulation. PART 2 PRODUCTS

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Subject to compliance with these specifications, only the following firms are approved manufacturers of sound rated door and frame assemblies:
   1. IAC Acoustics, "Noise-Lock" a division of Sound Seal, North Aurora, IL 630-270-1790, www.iacacoustics.com. or equal by:
      a. Noise Barriers, LLC, Schaumburg, IL 847-843-0500,www.noisebarriers.com/doors.
      b. Clark Door, Carlisle, United Kingdom 1 (844) 390-2485, http://www.cdldoors.com.
      c. Wenger Corporation, Owatonna, MN 507-455-4100, http://www.wengercorp.com/sound-isolation/acoustical-doors.php

2.2 MATERIALS

A. Sound rated doors and frames to be constructed from formed sheet steel or structural shapes and bars.

B. Sheet steel shall be commercial quality, level, cold rolled steel conforming to ASTM A- 366 or hot rolled, pickled and oiled steel confirming to ASTM A-1011. Exterior units shall be fabricated from galvanized sheet steel conforming to ASTM A-653 / A-653M commercial quality, minimum G60 zinc coating.

C. Steel shapes shall comply with ASTM A-36 and steel bars with ASTM-108, Grade 1018.

2.3 COMPONENTS

A. Steel Doors:

1. Fire rating shall be 1 hour as indicated on the Door Schedule.
2. Sound rated door thickness shall be as listed on the Door Schedule or as required to achieve the specified STC rating. Doors shall be minimum 2-1/2" thick for STC ratings 51 and greater.
3. Face gauges, internal sound retardant core, stiffening, and perimeter door edge construction shall be as required to achieve specified acoustical performance. Visible seams on door faces are not permitted.

B. Frames:
1. Frames shall be 14 gauge minimum welded units furnished "split" in two (2) pieces, inside and outside, that are mitered and welded together allowing for easy installation into either existing or new construction openings. Knock-down frames are not acceptable.
2. Corner joints shall have all contact edges closed tight, with trim faces mitered and continuously welded. The use of gussets will not be permitted.
3. Provide suitable anchors to properly install frames in partition types as shown on architect's drawings.

C. Door Hardware:
1. Refer to Section 08 7100 - Door Hardware for additional requirements.
2. The door manufacturer is responsible for supplying and installing all hardware.
3. Hinges shall be cam-lift type provided in conjunction with fixed adjustable door bottom seals. Surface strap or butt hinges, as well as automatic door bottoms, are not acceptable.
4. Hinge, lock, and head of the door shall close against positive neoprene compression and / or magnetic seals mounted in the door frame and / or leaf, as required to meet specified acoustical performance.
5. Where a double leaf door is specified, an overlapping astragal seal shall be provided for the full height of the door, as required to meet the specified acoustical performance. Provide door coordinator as necessary.
6. All hardware shall meet ADA and security requirements as required.

D. Vision Lights:
1. Refer to Section 08 8000 - Glazing for additional requirements.
2. Factory install double-glazed windows in dimensions per the door schedule. All glazing shall be installed by skilled workmen at the manufacturer's facility.
3. Windows shall be designed and installed without degrading acoustic rating of door.

2.4 FABRICATION

A. Assemble doors using all welded construction conforming to pertinent requirements of AWS D1-1. Assembly and adjustment of door, frame, acoustic seals and hinges shall be performed at the factory. Each entire unit shall be shipped to the job site ready for installation and subsequent operation.

B. Painting & Cleaning: After fabrication of doors and frames, all tool marks and surface imperfections shall be removed and exposed faces of all welded joints dressed smooth. Chemically treat all surfaces to ensure maximum paint adhesion and coat with a water- based rust-inhibitive primer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of door frames, door perimeter seals, and final adjustments shall be performed by factory-trained personnel under the supervision of the manufacturer.
1. The manufacturer shall provide factory-trained supervisory personnel at the site during the initial frame installation, during initial door installation, and at final inspection. The manufacturer shall issue a letter of compliance certifying the completion of the installation in accordance with these specifications.
2. Hang doors and adjust for free swinging operation without binding, sticking, sagging or excessive clearances.

3. Doors shall be installed and adjusted to meet all applicable ADA and security requirements without degrading acoustic performance.
4. All frames set in concrete, masonry, or steel construction shall be grouted solid during installation.
5. All frames installed in metal framed gypsum board construction shall be packed tightly with loose, lightweight fiberglass during installation.
6. Caulk exterior joint prior to painting.

B. Install sound control door assemblies during finish phase of construction to protect units from damage.

3.2 ADJUST AND CLEAN

A. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Check and readjust operating finish hardware items and acoustical seals, leaving doors and frames undamaged and in complete and proper operating condition.

3.3 FIELD TESTING VERIFICATION

A. If required, the Owner will retain the services of an independent acoustical consultant to conduct field sound transmission tests at any designated door locations where acoustical performance is suspected by the architect of not being in compliance with these specifications. The tests shall be conducted in accordance with ASTM E-336 to determine the Field Sound Transmission Class (FSTC) or Noise Isolation Class (NIC), as applicable and feasible. If such results indicate acoustical performance more than 5 points less than the specified STC ratings, it shall be the responsibility of the manufacturer and contractor, at their expense, to correct such deficiencies by methods approved by the architect prior to incorporation. Sound transmission tests shall be repeated and corrective measures implemented until the established performance requirements are met. All costs for retesting, shall be borne by the contractor and manufacturer.

B. Refer to Section 01 4000 - Quality Requirements for additional requirements.

END OF SECTION

ALUMINUM-FRAMED ENTRANCES AND STOREFRONT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Thermal Break Units.

B. Aluminum-framed entrance and storefront, with:

C. Insulated glass.

D. Spandrel glass

E. Infill panels of panels.

F. Foam framing seal.

G. Connections to building structure, anchors, fasteners, and accessories.

1.3 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 08 4413 - Glazed Aluminum Curtain Walls.

C. Section: 08 5113 - Aluminum Windows: Operable sash within glazing system.

1. **Note: Window and Storefront Manufacturer and Glazed Aluminum Curtain wall shall be the same.**

D. Section 08 8000 - Glazing: Glass and glazing accessories.

1.4 REFERENCE STANDARDS

A. Aluminum Association (AA)

1. Aluminum Construction Manual
2. Specifications for Aluminum Structures

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

D. AAMA 503-92 Voluntary Specification for Field Testing of Metal Storefronts, Curtain Wall and Sloped Glazing Systems

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

G. ASTM A 167 Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

J. ASTM C 509 Specification for cellular Elastomeric Preformed Gasket and Sealing

K. ASTM D 2240 Standard Test Method for Rubber Property - Durometer Hardness.

L. AISC American Institute for Steel Construction Manual of Steel Construction

M. ANSI Z 97.1 Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

N. DWS 1.1 Structural Welding Code

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 by 12 inches (300 by 300 mm) in size illustrating finished aluminum surface, glass infill panels,, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, dimensional limitations and anchorage.

G. Designer's Qualification Statement.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Engineering Calculations: Submit calculations prepared and certified by a professional Engineer, registered and licensed for practice in the State of New York showing compliance with specifications, including type and location of all fasteners.

1. Calculations shall include, but not necessarily be limited to, the engineering analysis of a particular manufacturer of all individual and aggregate components, fastening devices, connections, and embeds of work of this section.
2. Calculations shall be strictly coordinated with referenced to and submitted concurrently with shop drawings

K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

L. Warranty Period: Manufacturer's and installers shall provide Two (2) years from Date of Substantial Completion of the project.

1.7 QUALITY ASSURANCE

A. Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of New York.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.8 PRE-INSTALLATION MEETING

A. Conduct pre installation meeting one week prior to installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion for aluminum doors.

C. Correct defective Work within a ten year period after Date of Substantial Completion for all FRP doors.
   1. Manufacturer to certify that they have factory installed all hardware and such hardware is also guaranteed not to come loose during the guarantee period.

D. Provide 10 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

E. In addition the manufacturer further certifies that they have factory installed all hardware and such hardware is also guaranteed not to come loose during the guarantee period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:
   1. Basis of Design:
      a. Kawneer North America; a. Trifab™ VG 450 (2" Sightline) Framing System – 2" x 2-1/4" (50.8 mm x 57.2 mm) or 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension; Non-Thermal; Front Plane, Structural Silicone or Weatherseal Glazed, Stick Fabrication www.kawneer.com.

B. Substitutions: See Section 01 2500 - Substitution Procedures.

2.2 COMPONENTS

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper
   2. Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   3. Unitized, shop assembly.
   4. Glazing Rabbet: For 1/4 inch (6.25 mm) glazing for 2" x 2-1/4" frame.
   5. Glazing Rabbet: For 1 inch (25 mm) insulated glazing for 2' x 4-1/2" frame.
   6. Glazing Position: Front-set.
   7. Vertical Mullion Dimensions: 2" wide x 2-1/4" deep.
   8. Design Wind Load: 40 lbs/sf positive and negative.
   9. Condensation Resistance Factor:
      a. Glass to Center - 72 frame and 68 Glass (low-e) or 60 frame and 58 glass (clear).
      b. Glass to Interior - 56 frame and 67 Glass (low-e) or 54 frame and 58 glass (clear
   10. Overall U-Value Including Glazing: 0.38 (Fixed Glazing, BTU/hr/ft2/°F, maximum.
   11. Finish: High performance organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.

b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

12. Finish Color: As selected by Engineer from manufacturers standard colors.

13. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.

14. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

15. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

16. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

17. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

18. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

19. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

20. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.

B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.

a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

3. Water Leakage: None, when measured in accordance with ASTM E331 at specified pressure differential.

4. Thermal Transmittance (U-value): When tested to AAMA Specification 1503, the thermal transmittance (U-value) shall not be more than:

a. 0.38 BTU/hr sf deg F, Conforming to the requirements of the New York State Energy Code.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.

B. Glazing Stops: Flush.

C. Glazing: As specified in Section 08 8000.

1. For Exterior Framing: .

a. 1" insulated glazing for 2" x 4-1/2" frame.

b. 1/4' spandrel or 1/4" infill panel for 2" x 2-1/4" as indicated on drawings.

2. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

3. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
4. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

D. Infill Panels
1. Infill Panels: IP: Insulated, porcelain aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
a. Thickness: 5/16" .
b. Exterior Skin: Aluminum 0.016 inch (1 mm) thick.
c. Insulation Core: Isocyanurate 1.7-lb density insulation core with R value of 3.61 (RSI of ____).
d. Exterior and Interior Substrate: High density tempered hardboard inch (____ mm) thick.
e. Exterior Finish: Aluminum. Match window color..
f. Interior Skin: Aluminum 0.016 inch thick
g. Warranty: 25 years.
h. Product: "Mapes-R" as manufactured by Mapes Architectural Panels; sales@mapes.com / www.mapespanels.com

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members.

D. Anchors: Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure.

E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

F. Perimeter Sealant: Specified in Section 07 9200 - Joint Sealants.

2.5 FINISHES

A. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

B. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) system.
1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss as indicated on drawings.
a. Manufacturers:
a) Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating .

C. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

D. Color: As selected by Fuller and D'Angelo P.C. from manufacturer's standard range.

E. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.6 FABRICATION

A. Fabricate components with minimum clearances and shim space around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

C. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a non-absorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.

D. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.

E. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

F. Provisions for field replacement of glazing.

G. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

H. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

I. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

F. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

G. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

H. Install perimeter sealant in accordance with Section 07 9200 - Joint Sealants.

I. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

C. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.

D. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8 inch.

E. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch

3.4 FIELD QUALITY CONTROL

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

B. See Section 01 4000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

C. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.

1. Perform a minimum of two tests in each designated area as indicated on drawings.
2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.5 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.6 CLEANING

A. Provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Protect finished work from damage.

END OF SECTION

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Aluminum-framed curtain wall.

B. Insulated glazing.

C. Insulated spandrel glazing.

D. Firestopping between curtain wall and edge of floor slab.

1.3 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Steel attachment members.

B. Section 06 1000 - Rough Carpentry: Wood blocking.

C. Section 07 8400 - Firestopping: Firestop at system junction with structure.

D. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 08 8000 - Glazing.

1.4 REFERENCE STANDARDS

A. AAMA) – AAMA Glossary (AAMA AG) definitions for fenestration industry standard terminology and definitions

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts; 2009.

D. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.

E. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

F. AAMA 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights and Glazed Wall Sections; 2013.

G. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

H. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2016.

I. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

L. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

M. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

N. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2005 (Reapproved 2017).

O. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.

P. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

Q. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

R. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2015.

S. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2014.

T. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2006 (Reapproved 2010).

U. ASTM C1401 - Standard Guide for Structural Sealant Glazing; 2014.

V. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

W. 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; 2004 (Reapproved 2012).

X. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

Y. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

Z. ASTM E413 - Classification for Rating Sound Insulation; 2016.

AA. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting ten(10) working days before starting work of this section; require attendance by all affected installers.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

C. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work. Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 x 12 in size illustrating finished aluminum surface, glazing, and glazing materials.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed curtain wall systems, made from 12" (304.8) lengths of full-size components and showing details of the following:

1. Joinery.
2. Glazing.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. Design Data: Provide stamped and sealed drawings, framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.

H. Engineering Calculations: Submit calculations prepared and certified by a professional Engineer, registered and licensed for practice in the State of New York showing compliance with specifications, including type and location of all fasteners.

1. Calculations shall include, but not limited to, the engineering analysis of a particular manufacturer of all individual and aggregate components, fastening devices, including fasteners for blocking, connections, and embeds of work of this section.
2. Calculations shall be strictly coordinated with and referenced to details, and submitted concurrently with shop drawings

I. Structural Sealant Glazing (SSG): Submit product data and calculations showing compliance with performance requirements.

J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements

K. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

L. Designer's Qualification Statement.

M. Manufacturer's Qualification Statement.

N. Installer's Qualification Statement.

O. Warranty: Submit manufacturer warranty and ensure forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Manufacturer’s Field Services: Provide periodic site visit by manufacturer’s field service representative during installation and testing.

B. Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

C. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect, in writing for review

D. Designer Qualifications: Design curtain wall, including comprehensive engineering analysis, and its structural support framing components by a Professional Structural Engineer experienced in design of this work and licensed at New York.

E. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.

F. Full-Size Mock-up Testing: Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified thermal, structural, air infiltration, water penetration, and sound attenuation criteria.

G. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.

H. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than ten (10) years of documented experience.

I. Installer Qualifications: Company specializing in performing work of type specified and with at least five (5) years of documented experience and approved by manufacturer.

J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section 01 3000 - Administrative Requirements.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-ups.

B. Provide mock-up, approximately 8' x 10' in size, including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

C. Locate on-site Construction Manager; mock-up may remain as part of the Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a ten (10) year period after Date of Substantial Completion.
   1. Failures include, but are not limited to, the following:
      a. Failure to meet performance requirements.
      b. Structural failures including excessive deflection, water leakage, or air infiltration.
      c. Faulty operation of movable sash and hardware.
      d. Deterioration of metals or other materials beyond that which is normal.
      e. Failure of insulating glass.

C. Provide ten (1) year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.
   1. Five (5) years from date of Substantial Completion for AAMA 2603 Baked Enamel Finishes.
   2. Ten (10) years from date of Substantial Completion for AAMA 2604 High Performance Finishes.
   3. Twenty (20) years from date of Substantial Completion for AAMA 2605 Superior Performance Finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Glazed Aluminum Curtain Walls:
   1. Kawneer North America; 2500 UT Unitwall™ System - Pre-fabricated, Pre-assembled and Pre-glazed, Unitized Construction, Four-Side Structural Silicone Glazed SSG system.: www.kawneer.com.
   2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Pre-fabricated, pre-assembled, pre-glazed Unitized construction. Four side captured glazing.
   2. Structural sealant glazing (SSG) adhesive on four (4)-sides.
   3. Fabrication Method: Shop/factory unitized system.
   4. Glazing Method: Shop/factory glazed system.
   5. Vertical Mullion Dimensions: SSG system, 2-1/2" x 6-1/2".
   6. Finish: Superior performing organic coatings.
      a. Factory finish surfaces that will be exposed in completed assemblies.

b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

7. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
10. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:
a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Loosening or weakening of fasteners, attachments, and other components.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
1. Design Wind Loads: Comply with the following:
a. Positive Design Wind Load: 40 lbf/sq ft (1915 Pa).
b. Negative Design Wind Load: 40 lbf/sq ft (1915 Pa).
c. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
d. Member Deflection: For spans less than 13 feet 6 inches (4115 mm), limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch (19 mm), whichever is less and with full recovery of glazing materials.
e. Member Deflection: For spans over 13 feet 6 inches (4115 mm) and less than 40 feet (12.2 m), limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch (1/240 of span plus 6.4 mm), with full recovery of glazing materials.
2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with requirements of ASCE 7.
3. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.
4. Movement: Accommodate the following movement without damage to components or deterioration of seals:
a. Expansion and contraction caused by 0 deg (-17.75 degrees C) F 180 degrees F (82 degrees C) surface temperature.

b. Expansion and contraction caused by cycling temperature range of 170 degrees F (77 degrees C) over a 12 hour period.
c. Test Interior Ambient-Air Temperature: [75 deg F (24 deg C)] .
d. Movement of curtain wall relative to perimeter framing.
e. Deflection of structural support framing, under permanent and dynamic loads.
f. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.

5. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4 inch (19 mm) maximum, and a deflection parallel to the wall of L/360 with 1/8 inch (3.2 mm) maximum, whichever is less.

C. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s · m2) at a static air pressure differential of 6.24 psf (300 Pa).

D. Water Penetration Resistance on Manufactured Assembly (Static): No uncontrolled water on indoor face when tested as follows:
1. Test Pressure Differential: 15 psf (720 Pa).
2. Test Method: ASTM E331.

E. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 15 psf (718 Pa) as defined in AAMA 501.

F. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.

G. Thermal Performance Requirements:
1. Condensation Resistance (CRF): Not be less than: 80 frame and 71 glass (low E) when tested to AAMA 1503.
2. Overall U-value Including Glazing: 0.38, maximum, per AAMA 1503.

H. Acoustical Performance Requirements:
1. Sound Attenuation: STC of 36, minimum, from exterior to interior.
2. Test Method: AAMA 1801 using 5/16 inch (7.9 mm) inch laminated exterior glazing, 1/2 inch (12.7 mm) air space and 3/16 inch (4.7 mm) annealed interior glazing.

2.4 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
1. Cross-Section: As indicated on drawings.

B. Glazing: As specified in Section 08 8000.
1. Glazing Gaskets, Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
2. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
3. Glazing Sealants: As recommended by manufacturer for joint type

2.5 MATERIALS

A. Extruded Aluminum: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.

E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

F. Fasteners: Stainless steel; type as required by curtain wall manufacturer.

G. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

H. Thermal Breaks: Captured system 4-side continuous polyamide thermal break.

I. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.

J. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch (0.48 mm) minimum thickness.

K. Firestopping: As specified in Section 07 8400.

L. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.
   1. SSG adhesive in compliance with ASTM C920; Type S - Single-component, Grade NS, Class 50, Use NT, G, and A.
   2. Ultimate Tensile Strength: Minimum of 50 psi (345 kPa) as determined by test method ASTM C1135 under the following conditions.
      a. Exposure to air temperatures of 190 degrees F (88 degrees C) and minus 20 degrees F (minus 29 degrees C).
      b. Water immersion for seven (7) days, minimum.
      c. Exposure to weathering for 5,000 hours, minimum.
   3. Sealant Design Tensile Strength: 20 psi (139 kPa), maximum.
   4. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.
   5. Color: Grey.
   6. Volatile Organic Compound (VOC) Content: Less than 20 g/l.
   7. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793, and in compliance with insulating glass secondary sealant design standards of ASTM C1249.
   8. Manufacturers:
      a. Dow Chemical Company; DOWSIL 121 Structural Glazing Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.

M. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

N. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, and compatible with flashing material.

O. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

P. Glazing Accessories: As specified in Section 08 8000.

Q. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.6 CURTAIN WALL FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Glazing System: Four-Side Structural Silicone Glazed.
2. Glazing Plane: Front.

B. Glass: 1" (25.4) insulating glass. 1" (25.4) for insulated spandrel applications.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as specified and tested by manufacturer.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities.

2.7 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings

2.8 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss as indicated on drawings.
2. Manufacturers:
a. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating .

B. Color: To be selected by Fuller and D'Angelo P.C. from manufacturer's standard range.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions and approved shop drawings.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

D. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" (228.6) on center.

E. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

F. Provide alignment attachments and shims to permanently fasten system to building structure.

G. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

H. Provide thermal isolation where components penetrate or disrupt building insulation.

I. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

J. Install firestopping at each floor slab edge.

K. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

L. Pressure Plate Framing: Install glazing in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

M. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weatherseal sealant in accordance with manufacturer's instructions.

N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 0.5 inches per 100 ft (12 mm/30 m), whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch (19 mm) and minimum of 1/4 inch (6 mm).

3.4 FIELD QUALITY CONTROL

A. Provide services of curtain wall manufacturer's field representative to observe for proper installation of system and submit report.

1. Provide a minimum of three (3) inspections; one at start of installation; one at 50% completion and one at completion.

B. See Section 01 4000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

C. Provide field testing of installed curtain wall system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.

D. The owner shall provide and pay for all field testing.
   1. Perform a minimum of two tests in each designated area as directed by Architect.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field Tests: Construction Manager shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
      a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, which ever is greater.
      b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf (383 Pa).
      c. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Section 01 4000 - Quality Requirements.

E. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.5 ADJUSTING

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.7 PROTECTION

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

ALUMINUM WINDOWS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Exterior extruded aluminum windows with fixed sash, operating sash, and motorized rotary operators.

B. Factory glazing.

C. Operating hardware.

D. Insect screens.

E. Foam sealant for filling perimeter window space.

1.3 RELATED REQUIREMENTS05 4000 - Cold-Formed Metal Framing

A. Section 04 2000 - Unit Masonry.

B. Section 05 5000 - Metal Fabrications: Steel lintels.

C. Section 05 4000 - Cold-Formed Metal Framing.

D. Section 06 1000 - Rough Carpentry: Wood perimeter shims and blocking.

E. Section 07 2500 - Weather Barriers: Sealing frame to weather barrier installed on adjacent construction.

F. Section 07 9200 - Joint Sealants: Sealing joints between window frames and adjacent construction.

G. Section 08 8000 - Glazing.

H. Section 12 2940 - Roller Shades.

I. Division 26 Electrical: Electrical for material and power for rotary operators.

1.4 DEFINITIONS

A. Performance class designations according to AAMA/WDMA/CSA 101/I.S.2/A440-08:
   1. AW: Architectural.

B. Performance grade number according to AAMA/WDMA/CSA 101/I.S.2/A440-08:
   1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

D. Minimum Test Size: Smallest size permitted for performance class (gateway test size) or as specified elsewhere in this section, whichever is more stringent. Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class. Downsized test reports will not be considered acceptable.

1.5 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2017.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2012.

D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

E. AAMA 701/702 Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

G. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

H. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

I. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

J. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002 (Reapproved 2010).

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

L. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).

M. ASTM E1105 - Standard 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; 2015.

N. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017.

1.6 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide products that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440-08 requirements for specific Performance Requirements Concealed vent outswing casement:
      a. Performance Class: AW.
      b. Performance Grade: 10.
   2. Performance Validation: Windows shall comply with AAMA/WDMA/CSA 101/I.S.2/A440-08 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
   3. Design and size windows to withstand the following load requirements, when tested in accordance with ASTM E330 using test loads equal to 1.5 times the design wind loads with 10 second duration of maximum load:
      a. Positive Design Wind Load: 40 lbs/sf.
      b. Negative Design Wind Load: 40 lbs/sf.
      c. Project In and Out Windows: When closed and locked, a minimum static air pressure difference of 150 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. (1.5 x Design Load).
      d. In swinging and Out swinging Casement Windows: When closed and locked, a minimum static air pressure difference of 150 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. (1.5 x Design Load).
      e. Double Hung Windows: When closed and locked, a minimum static air pressure difference of 60 psf and 105 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. (1.5 x Design Load).
      f. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

g. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.

h. Forced Entry Resistance: Conform to ASTM F588 requirements for performance level 10 .

B. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:

1. Projected Windows In/Out: 60” x 144” (F/PO/F/PI)
2. Outswing Casement Windows: 36” x 60”
3. Double-hung windows: 60” x 99”.

C. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units of the minimum test size specified herein that pass AAMA/WDMA/CSA 101/I.S.2/A440-08, Uniform Load Structural and Uniform Load Deflection Tests:

1. Uniform Load Deflection: A minimum static air pressure difference of 40 psf shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.
2. Uniform Load Structural Test: 217.5 psf (positive and negative).
3. Uniform Load Deflection Test: 145 psf (positive and negative).

D. Component Testing: Window components shall be tested in accordance with procedures described in ANSI/AAMA 101-2005 for AW grade windows

E. Air Infiltration: Projected Windows: Limit air infiltration through assembly to 0.10 for projected of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-08, Air Infiltration Test. Minimum size test window: 60" x 36", projected; 36" x 60" casement.

1. Double Hung: Maximum Rate: 0.3 cfm/sq.ft. of area at an inward test pressure of 6.24 lbf/sq.ft..

F. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure of minimum pressure differential 15 lbf/sq ft (718.5 Pa) of static air for casement and projected and 12 lbf/sq ft (574.8 Pa) for double hung, .

G. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a minimum CRF:

1. Projected: 63
2. Casement: 60
3. Double Hung: 47

H. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.

I. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.

J. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08 for operating window types indicated.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

C. Performance Validation: Provide specified performance validation before submitting shop drawings or starting fabrication.

D. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations and installation requirements.

E. Product Details: Provide full size product details showing all frame and sash details, dimensions, thermal break construction, wall thicknesses, weather-stripping details and joinery. Details must accurately reflect all glazing and hardware options specified herein

F. Engineering Calculations: Submit calculations prepared and certified by a professional Engineer, registered and licensed for practice in the State of New York showing compliance with specifications, including type and location of all fasteners.
   1. Calculations shall include, but not limited to, the engineering analysis of a particular manufacturer of all individual and aggregate components, fastening devices, including fasteners for blocking, connections, and embeds of work of this section.
   2. Calculations shall be strictly coordinated with and referenced to details, and submitted concurrently with shop drawings

G. Samples: Submit two samples, 12 by 12 inch (300 by 300 mm) in size illustrating typical corner construction, accessories, and finishes.

H. Submit two samples of operating hardware and accessories involving color selection.

I. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
   1. Evidence of AAMA Certification.
   2. Evidence of WDMA Certification.
   3. Evidence of CSA Certification.
   4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

J. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s), by prepared by a qualified testing agency for each window type being used on the project, not more than four years old, showing compliance with performance requirements in excess of those prescribed by specified grade. Test reports based on the use of downsized test units will not be accepted.

K. Certificates: Certify that windows meet or exceed specified requirements.

L. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

M. Maintenance Data: For operable window sash, operating hardware and finishes to include in maintenance manuals.

N. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

O. Warranty: Submit manufacturer warranty and special warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

P. Manufacturer's Certification: Provide certification stating the manufacturer and series (model) number of the product conforms to the specifications.

Q. Product Test Reports: Provide comprehensive test reports not more than four years old prepared by a qualified testing agency for each window type being used on the project. Test reports based on the use of downsized test units will not be accepted.

1.9 QUALITY ASSURANCE

A. Fire rated glass and framing must be provided by a single-source, US manufacturer. Distributors of fire rated glass and framing are not to be considered as manufacturers

B. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten(10) years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least five (5) years of documented experience and approved by manufacturer for installation of units required for this Project.

E. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

F. Product Requirements: For maximum performance, windows for this project must meet both the testing requirements as contained herein and the minimum material requirements specified. Windows that carry the applicable AAMA rating but do not meet the material thicknesses, depths, etc. shall not be acceptable for use on this project.

G. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's written approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

H. Fenestration Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, "Standard/Specification for Windows, Doors, and Unit Skylights" for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1. Provide AAMA-certified aluminum windows.

I. Fenestration Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, "Standard/Specification for Windows, Doors, and Unit Skylights" for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1. Provide AAMA-certified aluminum windows.

J. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.10 MOCKUP:

A. Prior to installation install typical window for review and approval.

B. Locate as directed by the Architect or Construction Manager.

C. Provide adjustments and recommend by Architect or Construction Manager.

D. Mockup may be used in the project.

E. Window manufacturer's technical representative and structural engineer shall inspect and provide a written report that window is installed in accordance withe the design criteria.

1.11 PRE-INSTALLATION MEETING

A. Convene one (1) week before starting work of this section at project site to review methods and procedures related to aluminum windows including, but not limited to, the following:.

B. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

C. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components.

D. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.

E. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.13 FIELD CONDITIONS

A. Field Measurements: For retrofit installations, verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

B. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).

C. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.14 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure to meet performance requirements.
      b. Structural failures including excessive deflection, water leakage, or air infiltration.
      c. Faulty operation of movable sash and hardware.
      d. Deterioration of metals or other materials beyond that which is normal.
      e. Failure of insulating glass.

C. Correct defective Work within a ten (10) year period after Date of Substantial Completion.

D. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

E. Balance System: Correct/Replace balances for failure or defective Work within a ten (10) year period after Date of Substantial Completion.

F. Painted Metal Finishes:
   1. Provide manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.
   2. Five (5) years from date of Substantial Completion for AAMA 2603 Baked Enamel Finishes.
   3. Twenty (20) years from date of Substantial Completion for AAMA 2605 Superior Performance Finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The basis of design for these specifications is as follows:
   1. Architectural Window Manufacturing Series 3000i GT Project-out and Project-in and related fixed aluminum windows to meet the AAMA performance criteria for AP-AW100 (projected), C-AW100(casement), and F-AW100(fixed).
   2. Architectural Window Manufacturing Series 4000i Double Hung aluminum windows to meet the AAMA performance criteria for H-AW100.

B. Equivalents: Subject to compliance with all material and performance requirements outlined in these specifications, "or equal" products by other manufacturers will be considered for use subject to review by the Architect. The Architect's decision regarding equivalency is final.
   1. See Section 01 2500 Substitution Procedures.

2.2 WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.125-inch thickness at any location for the main frame and sash members.
   2. Frame Depth: As follows:
      a. Projected Out: 3-1/2" minimum and 3-1/2" sash depth.
      b. Double Hung: 4-1/4" minimum and 1-1/4 minimum sash depth/
   3. Operable Units: Double weatherstripped.
   4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   6. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   8. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
   9. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F (82.2 degrees C) surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
   10. Condensation Resistance Factor: 63 minimum for casement and 60 for casement.
   11. Thermal Transmittance Overall U-value, Including Glazing:
      a. Project Windows: When tested to AAMA Specification 1503, the conductive thermal transmittance (U-factor) shall not be more than.0.45 BTU/hr/ft2/°F.
      b. Outswing Casement Windows: When tested to AAMA Specification 1503, the conductive thermal transmittance (U-factor) shall not be more than 0.45 BTU/hr/ft2/°F
      c. Double Hung Windows: When tested to AAMA Specification 1503, the conductive thermal transmittance (U-factor) shall not be more than 0.45 BTU/hr/ft2/°F.
      d. Fixed Windows: When tested to AAMA Specification 1503, the conductive thermal transmittance (U-factor) shall not be more than 0.38 BTU/hr/ft2/°F.
   12. Life Cycle Requirements: No damage to fasteners, hardware parts or other components that would render operable windows in operable and not reduction in air and water infiltration resistance when tested according to AAMA 910.

B. Fixed, Non-Operable Type:
   1. Construction: Thermally broken.
   2. Glazing: Insulated; ; Refer to Section 08 8000 - Glazing. Low-E
   3. Exterior Finish: Superior performance organic coating.

4. Interior Finish: Baked enamel.

C. Out/In swinging Casement Type:
1. Construction: Thermally broken.
2. Glazing: Insulated; ; Refer to Section 08 8000 - Glazing. Low-E.
3. Exterior Finish: Superior performance organic coating.
4. Interior Finish: Baked Enamel.

D. Out/In swinging Projected Type:
1. Construction: Thermally broken.
2. Glazing: Insulated and polycarbonite for Gymnasium; ; Refer to Section 08 8000 - Glazing. Low-E
3. Exterior Finish: High performance organic coating.
4. Interior Finish: Baked Enamel.

E. Double-Hung Type:
1. Construction: Thermally broken.
2. Glazing: Insulated; Refer to Section 08 8000 Glass and Glazing; Low-E.
3. Exterior Finish: Superior performance organic coating.
4. Interior Finish: Baked Enamel.

2.3 COMPONENTS

A. Frames shall be: thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.

B. Glazing: As specified in Section 08 8000.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated

D. Sills: Extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch (12 mm) beyond wall face; one piece full width of opening. Jamb angles to terminate sill end.

E. Infill Panels: IP: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
1. Thickness: 1".
2. Exterior Skin: Aluminum 0.04 inch (1 mm) thick.
3. Insulation Core: Isocyanurate insulation core with R value of 14.848.
4. Exterior and Interior Substrate: 3/16" High density tempered hardboard inch (4.6 mm) thick.
5. Exterior Finish: Smooth standard color. Kyner .
6. Interior Finish: Aluminum Clear anodized.
7. Warranty: 25 years.
8. Product: "Mapes-R" as manufactured by Mapes Architectural Panels; sales@mapes.com / www.mapespanels.com

F. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
1. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's high-transparency mesh.
2. Frame Finish: Same as window frame and sash.
3. Provide wicket screen for access to operating handle.
a. Use where indicated on drawings

G. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
   1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2/A440-08.

H. Replaceable Weather Seals: Comply with AAMA 701/702.

I. Fasteners: Non magnetic stainless steel or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
   1. All fasteners must be concealed except where unavoidable for application of hardware.
   2. For application of hardware, where required, use non-magnetic stainless steel phillip flat head machine screws

J. Glazing Materials: As specified in Section 08 8001 - Glazing.

K. Sealant and Backing Materials: As specified in Section 07 9200 - Joint Sealants.

L. Structural Sealant: The structural seal and weather seal shall be a two-part structural silicone applied and cured as per the sealant manufacturer’s instructions.

2.4 ACCESSORIES

A. Rescue Labels: Windows designated on drawings as “EER” emergency escape and rescue windows shall meet all applicable codes and shall include two (2) conforming label as follows:
   "RESCUE WINDOW
   FOR EMERGENCY USE ONLY”
   1. Signs shall be 3” x 5” with bright yellow background with black letter.
      Text shall be read from both sides
   2. One label shall be placed on the window and one place on the window treatment (roller shade, horizontal blinds, etc) and visible when the blind are closed. Coordinate with window treatment installer.

B. Weather Stripping: Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
   1. Double Hung: Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
   2. Polypropylene sheet or polypropylene-coated material.
   3. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.

C. Window and Door Joint Seal: Polyurethane-based joint filler:
   1. UL Classified.
   2. Product: "Great Stuff" as manufactured by Dow Chemical.
      a. "Gaps and Cracks: for joints less than 1".
      b. "Big Gap Filler" for joint over 1".
   3. Use for all filling all spaces and joints around windows and doors located on exterior walls.

D. Flashing: Self adhering, rubberized asphalt and high density polythene film.
   1. Thickness: 0.06 inch.
   2. Locations: Use under windows sills as shown on drawings.
   3. Product: Bituthene 3000 as manufactured by Owens Corning

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to

accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Projected Windows:
1. Hinge: Concealed four-bar friction hinge complying with AAMA 904 with adjustable-slide friction shoe; two per ventilator, stainless steel.
a. 4-bar hinges.
b. Lock: Cam-action, white bronze locking handle and keeper (2 if over 42" wide).
c. Provide pole-operated automatic white bronze locks on inward acting ventilators, where the distance to the operating hardware exceeds five feet above the floor. 1 pole operator and pole hanger per room that has operable window hardware more than 60 inches above floor
d. Limit Device: Integral adjustable stainless steel, stop (two per ventilator). Set the limit to 8”.

D. Double Hung Windows:
1. Counterbalancing Mechanism: Comply with AAMA 902.
a. Sash Balance Class C Concealed ultra-lift spring type capable of lifting 80 percent of sash weight of size and capacity to hold sash stationary at any open position.
2. Removable Lift-Out Sash: Design windows and provide with hardware to permit removal of sash from inside for cleaning. Units with tilt-in sash will not be acceptable.
3. Handle: Continuous, integral lift rail on bottom rail of lower sash and pull down rail on top rail of upper sash.
4. Lower Sash Lock: Spring-loaded, snap-type white bronze lock on bottom rail of lower sash (two if window is 48" wide or greater).
5. Upper Sash Lock: Pole-operated snap type white bronze lock on top rail of upper sash.
6. Pole Socket: Provide a pole socket or groove on inside face of top rail of lower sash on windows with meeting rails more than 72 inches above floor.
7. Pole operated white bronze head snap locks.
8. Limit Device: Continuous extruded aluminum sash stop limit device with rubber bumper; for each lower operable sash located at jamb; two per sash

E. Casement Windows Provide the following operating hardware:
1. Lock: Two (2) point, white bronze locking handle with strike, plus one (1) white bronze pull handle.
2. Hinge: Three (3) aluminum butt hinges. (Same finish as exterior of window).
3. Stay Arm: One 90 degree stainless steel stay arm.
4. Limit Device: Stainless steel limit arm with key release for non egress windows.
a. Provide Pull Handle on windows.

F. Gang Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A. Location where indicated and all Gymnasium clerestory windows.
1. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.
2. Electrically operated.
a. Actuator with 3 position switch.
a) 24V VDC.
b. Attachments at the window.
c. Voltage:120V and low voltage
d. Control Panel location as shown on drawings.
a) Housing NEMA type 1,

e. Switch and other components location as shown on drawings.
f. Refer to electrical drawings.

3. Manufacturer:
   a. Clearline Window Control System; North Wales, PA 19454-0368; (215)-699-9292; www.clearlineinc.com

2.6 FABRICATION

A. General: Fabricate aluminum window in sizes indicated, that comply with requirements and that meet or exceed AAMA/WDMA/CSA 101/I.S.2/A440-08 performance requirements for the following window type and performance class. Include a compete system for assembling components and anchoring windows.
   1. All Windows: Grade AW.
   2. Performance Class. 100

B. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed (products with exposed thermal barriers will not be acceptable), conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
   1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
   2. No thermal short circuits shall occur between the exterior and interior.
   3. The thermal barrier shall be Engineer's INSULBAR® or equal, and consist of two glass reinforced polyamide nylon 6/6 struts mechanically crimped in raceways extruded in the exterior and interior extrusions. Poured and debridged urethane thermal barriers shall not be permitted.
   4. Poured and debridged urethane thermal barriers shall not be permitted.

D. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

E. Prepare components to receive anchor devices.

F. Arrange fasteners and attachments to ensure concealment from view.

G. Prepare components with internal reinforcement for operating hardware.

H. Provide steel internal reinforcement in mullions as required to meet loading requirements.

I. Provide internal drainage of glazing spaces to exterior through weep holes.

J. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

K. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch- thick extruded aluminum. Finish to match window units. Provide subframes capable of withstanding design loads of window units

L. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames

M. Weather Stripping: Provide full-perimeter weather stripping (2 vinyl bulb type and 1 vinyl fin type) for each operable sash and ventilator.

N. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440-08.

O. Muntins: Where shown on drawings, muntins shall be 1/2" deep profiled extruded aluminum applied to the exterior of dual glazing. Roll formed muntins shall not be acceptable.

2.7 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Exterior of window:

1. Superior-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
   b. Color and Gloss: As selected by Architect from manufacturer's full range of 20 standard color non-metalic.

D. Interior of window:

1. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
   a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603.
   b. Color: As selected by Architect from manufacturer's full range of 20 standard colors (non-metallic).

E. Apply one coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

B. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 REMOVALS

A. Asbestos and lead caulking, putty, sealant, paint and window components shall be removed as per asbestos and lead abatement Section 02 2080 of the specifications.

B. The following procedures shall be followed when existing window are removed:

1. Work must be in compliance with OSHA Construction Standard (29 CFR 1926.62)..
2. Windows directly below, above and adjacent to the work area shall be closed.
3. Provide tarps on the outside of the building to catch all dust, debris and paint chips when windows are being removed and installed.
4. Floor surfaces along the length of the window shall be provided one layer of six mil plastic.
5. All air vents in the room shall be closed and/or shut off and sealed.
6. Access to all rooms undergoing window replacement shall be restricted to prevent unauthorized entry.
7. Owner to remove all objects, items, books, etc. from window wall casework and adjacent end walls. (01 7000). Owner to reinstall.
8. The Contractor shall cover with a drop cloth.
9. Contractor shall provide labor for daily cleanup on the interior and the exterior of the building as required or directed by the Owner's Representative. Any visible debris shall be removed prior to the on a daily basis. Only wet cleaning methods and/or HEPA vacuuming shall be used to clean.
10. All window components and debris disposed of properly in accordance with Federal, State and Local Regulations. Refer to Section 01500 “Temporary Facilities” and asbestos and lead abatement sections for containers required.
11. Removal of existing windows and installation of new windows shall not be done until existing asbestos in windows and window frames is abated
12. Do not remove existing window sash, frame or components until new replacement windows are on site and ready for installation. Do not leave any openings unprotected at end of work day or during periods of excessive cold weather or precipitation.
13. At completion of the each work area HEPA vacuumed and wet wiped.
14. All corridors used by Contractors shall be mopped and left clean daily.

3.3 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows in accordance with manufacturer's instructions.

C. Install window assembly in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

D. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

E. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

F. Install sill and sill end angles members in bed of sealant or with gaskets, as indicated, for weathertight construction.

G. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior

H. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

J. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

K. Install operating hardware not pre-installed by manufacturer.

L. Install glass and infill panels in accordance with requirements specified in Section 08 8001 - Glazing.

M. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacture's instructions.
   1. Cut back to permit application of joint sealant.

N. Install perimeter sealant in accordance with requirements specified in Section 07 9200 - Joint Sealants.

3.4 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 10 ft (3 mm/3 m), whichever is less.

3.5 FIELD QUALITY CONTROL

A. Provide services of aluminum window manufacturer's field representative to inspect the installation and certify that the window installation has been furnished and installed in accordance with manufacturer's instructions and as specified.
   1. Provide a minimum of three (3) inspections; one at start of installation; one at 50% completion and one at completion.
   2. Submit written report after each inspection.

B. See Section 01 4000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

C. Provide field testing of installed aluminum windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
   1. Perform tests on three individual windows in designated locations as directed by the Construction Manager.
   2. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf (91 Pa).
   3. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf (75 Pa).

3.6 Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.7 ADJUSTING

A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts

3.8 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

E. Protection of newly installed windows and/or final cleaning of glass and aluminum to remove any accumulations that may have occurred during the construction period is to be the responsibility of the General Contractor or Owner.

F. Comply with manufacturer’s written recommendations for final cleaning and maintenance

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system

END OF SECTION

FIRE RATED STEEL WINDOWS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Factory finished fire rated single hung steel windows with fixed and self-closing operating sash.

B. Factory-installed glazing .

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry.

B. Section 05 5000 - Metal Fabrications: Steel lintels.

C. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.4 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2017.

B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2012.

C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2016.

E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

I. 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; 2004 (Reapproved 2012).

J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

L. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).

M. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017.

N. Underwriters Laboratories: Test report for fire rated assemblies.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, fasteners, anchors, information on glass and glazing, internal drainage details, and decription of hardware and accessories.

C. Performance Validation: Provide specified performance validation before submitting shop drawings or starting fabrication.

D. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, affected related work; anchorage locations and installation requirements.

E. Certificates: Certify that products of this section meet or exceed specified requirements.

F. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing windows specified in this section, with not less than ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

C. UL Listed and Certified.
1. Self-closing 45 minute rating.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).

B. Maintain this minimum temperature during and after installation of sealants.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two (2) year period after Date of Substantial Completion.

C. Provide ten (10) year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.

D. Balance System: Correct/Replace balances for failure or defective Work within a five (5) year period after Date of Substantial Completion.

E. Painted Metal Finishes:
1. Provide manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.
2. Ten (10) years from date of Substantial Completion for AAMA 2604 High Performance Finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Windows:
1. "FR7650TSH" (Single Hung) "FR6000" (Fixed) as manufactured by Optimum Window, 28 Canal Street, Ellenville, NY 12428; 845-647-1900, optimumwindow.com.
2. See Section 01 2500 Substitution Procedures.

2.2 STEEL WINDOWS

A. Steel Windows: Formed steel sheet sections, factory fabricated, factory finished, with vision glass, related flashings, anchorage and attachment devices.
   1. Sash Configuration: Single Hung lights.
   2. Frame Members: Thermally broken.
   3. Fire Rating: 45 minutes.
   4. Muntins: Where shown on drawings, muntins shall be 1/2" deep profiled steel applied to the exterior of the glazing.

2.3 PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand wind loads without damage or permanent set, when tested in accordance with ASTM E330/E330M, using pressure equal to 1.5 times specified design pressures, with 10 second duration of maximum load.

B. Design Pressure:
   1. Positive Design Pressure: 40 psf (1915 Pa).
   2. Negative Design Pressure: 40 psf (1915 Pa).

C. Air Infiltration: Limit air infiltration through assembly to.26 cfm/ft2 of wall area, measured at a reference differential pressure across assembly of 1.57 psf (75 Pa) as measured in accordance with ASTM E283.

D. Overall Thermal Transmittance (U-value): 0.45, maximum, including glazing, measured on window sizes required for this project.

E. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 2.86 lbf/sq ft (136.85 N/sq m).

2.4 COMPONENTS

A. Frames: 3-9/16" wide by 3-11/16" deep profile; applied glass stops of screw fastened type.

B. Sills: 4 inch (100 mm) thick, formed steel; sloped for positive wash; fit under sash leg to 1/2 inch (12 mm) beyond wall face; one piece full width of opening.

C. Operable Sash Weather Stripping: Wool pile; permanently resilient, profiled to effect weather seal.

D. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

2.5 MATERIALS

A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating; 26 gage, 0.0179 inch (0.45 mm) thick base metal.

2.6 GLASS AND GLAZING MATERIALS

A. Factory installed and tested as a component of rated assembly.
   1. Insulated Glass units meeting the following:
      a. Total Thickness: 1"
      b. Outer Pane: Type 1/4" tempered glass w/ solarban 70 coating on #2 surface..
      c. Inner Pane: Type 3/16" Ceramic and Firerated glazing type..

2.7 HARDWARE

A. Balances: Manufacture's standard, calibrates based upon sash weight.

B. Sash lock: Lever handle with cam lock.
   1. One sweep lock at center up to 36" sash; two sweeps over 36".

C. Lift Handles: Two per sash.

D. Window Opening Control Devices (WOCD): Provide operable window sash hardware that limits openings to only allow passage of 4 inch (102 mm) diameter rigid sphere or less, and are easily releasable to fully open without use of keys, tools, or special knowledge.

2.8 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush and hairline.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange non-corrosive fasteners to conceal from view.

E. Prepare components with reinforcement for operating hardware.

F. EPDM and Silicone Pile weatherstripping.

2.9 FINISHES

A. Window Frames: Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system. finish.

1. Exterior Surfaces: Color as selected to match existing adjacent aluminum windows of new addition..
2. Interior Surfaces: Color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.1 EXAMINATION

3.2 INSTALLATION

A. Install window frames and glass and glazing in accordance with manufacturers instructions and as required by listing agency.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install operating hardware.

E. Install glass in accordance with Section 08 8000, to glazing method required to achieve performance criteria.

3.3 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches in 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 10 ft (3 mm/3 m).

3.4 FIELD QUALITY CONTROL

A. Provide services of steel window manufacturer's field representative to observe for proper installation of system and submit report indicating compliance with fire rating criteria..

3.5 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.6 CLEANING

A. Remove labels and visible markings.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

3.7 PROTECTION

A. Do not permit continuing construction activities near unprotected finish surfaces.

END OF SECTION

FINISH HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:
   1. Mechanical and electrified door hardware for:
      a. Swinging doors.
      b. Electronic access control system components, including:
         a) Electronic access control locksets and exit device trim.
      c. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
   2. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
      a. Windows
      b. Cabinets (casework), including locks in cabinets
      c. Signage
      d. Toilet accessories
      e. Overhead doors

1.3 RELATED SECTIONS:

A. Section 01 2300 - Alternates for alternates affecting this section.

B. Section 01 6180 - Product Standardization

C. Section 01 6190 - Matrix of Building System Responsibility

D. Section 07 9200 - Joint Sealants for sealant requirements applicable to threshold installation specified in this section.

E. Sections 09 9123 - Interior Painting for touchup finishing or refinishing of existing openings modified by this section.

F. Division 26 sections for connections to electrical power system and for low-voltage wiring.

G. Section 28 1000 Security System for coordination with other components of electronic access control system.

1.4 REFERENCES

A. Fire/Life Safety
   1. NFPA - National Fire Protection Association
      a. NFPA 70 - National Electric Code
      b. NFPA 80 - Standard for Fire Doors and Fire Windows
      c. NFPA 101 - Life Safety Code
      d. NFPA 105 - Smoke and Draft Control Door Assemblies
      e. New York State Fire Safety Code.
   2. UL - Underwriters Laboratories
      a. UL 10B - Fire Test of Door Assemblies
      b. UL 10C - Positive Pressure Test of Fire Door Assemblies
      c. UL 1784 - Air Leakage Tests of Door Assemblies
      d. UL 305 - Panic Hardware
   3. Accessibility

a. ADA - Americans with Disabilities Act.
b. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

4. DHI - Door and Hardware Institute
   a. Sequence and Format for the Hardware Schedule
   b. Recommended Locations for Builders Hardware
   c. Key Systems and Nomenclature
5. ANSI - American National Standards Institute
   a. ANSI/BHMA A156.1 - A156.29, and ANSI A156.31 - Standards for Hardware and Specialties

1.5 SUBMITTALS

A. General:
1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
4. Action Submittals:
   a. Product Data: Product data including manufacturers' 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.
   b. 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:
         (a) Details of interface of electrified door hardware and building safety and security systems.
         (b) Schematic diagram of systems that interface with electrified door hardware.
         (c) Point-to-point wiring.
         (d) Risers.
   c. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
      a) Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
   d. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
      a) Door Index; include door number, heading number, and Architects hardware set number.
      b) Opening Lock Function Spreadsheet: List locking device and function for each opening.
      c) Type, style, function, size, and finish of each hardware item.
      d) Name and manufacturer of each item.
      e) Fastenings and other pertinent information.
      f) Location of each hardware set cross-referenced to indications on Drawings.
      g) Explanation of all abbreviations, symbols, and codes contained in schedule.
      h) Mounting locations for hardware.

i) Door and frame sizes and materials.
j) Name and phone number for local manufacturer's representative for each product.
k) Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
(a) Submittal Sequence: Submit door hardware schedule 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 that is critical in Project construction schedule.

e. Key Schedule:
a) After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
b) Use ANSI 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.
(a) 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.
g) Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

5. Informational Submittals:
a. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
b. Product Certificates for electrified door hardware, signed by manufacturer:
a) Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
c. Certificates of Compliance:
a) Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
b) Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in “QUALITY ASSURANCE” article, herein.
d. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
e. Warranty: Special warranty specified in this Section.
6. Closeout Submittals:
a. Operations and Maintenance Data : Provide in accordance with Section 01 7800 - Closeout Submittals 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) Name, address, and phone number of local representative for each manufacturer.
d) Parts list for each product.
e) Final approved hardware schedule, edited to reflect conditions as-installed.
f) Final keying schedule
g) Copies of floor plans with keying nomenclature
h) As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
i) Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.6 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
1. Where specific manufacturer's product is named and accompanied by make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.) Locksets will be purchase under State contract and provided to Contractor for installation. Refer to Section 00 4440 Owner Supplied Contractor Installed.
a. Where no additional products or manufacturers are listed in product category, requirements for Section 01 2500 shall govern product selection.
b. Where products indicate "acceptable substitute" or "acceptable manufacturer", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
2. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
a. Warehousing Facilities: In Project's vicinity.
b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
d. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
a) Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
3. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
4. Architectural Hardware Consultant Qualifications: 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, Architectural Hardware Consultant (AHC).
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 diagrams.

e. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

5. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
   a. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
   b. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
6. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, 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.
7. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
   a. Air Leakage Rate: 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.
8. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
9. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
10. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
    a. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
    b. Maximum opening-force requirements:
       a) Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
       b) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    c. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
    d. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.
11. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.
    a. Attendees: Owner, Contractor, Architect, Installer, and Supplier's Architectural Hardware Consultant.
    b. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
       a) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
       b) Preliminary key system schematic diagram.
       c) Requirements for key control system.
       d) Requirements for access control.
       e) Address for delivery of keys.
12. Pre-installation Conference: Conduct conference at Project site.

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.

13. Coordination Conferences:
    a. Installation Coordination Conference: Prior to hardware release schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
        a) Attendees: Door hardware Supplier/Installer, Contractor.
        b) After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.
    b. Electronic Hardware Coordination Conference: Schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
        a) Attendees: Electronic door hardware doors and frames supplier/installer, electrical contractor, security contractor, Owner, Architect and Contractor.
        b) After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.
    c. Electronic Door Hardware Coordination Matrix:
        a) Doors requiring electronic (wireless and wired) hardware and integration with the security system shall be identified by door number. The basis of information for the matrix shall be derived from the architectural door schedule. Input shall be from the Construction Contractor, Systems Integrator, Security Sub-Contractor and Electrical Contractor.
        b) The bid documents and field verifications of components shall be used to ensure that efficient and orderly installation of each part of the work and its convergence with existing systems. Each contractor shall coordinate its operations with operations of those specified in other Sections. No work shall begin until such coordination matrix has been reviewed and signed off by each contractor. Any conflicts or adjustments that are unresolvable shall be brought to the attention of the Architect. After final coordination has been agreed upon and signed by all contractors the Construction Contractor shall distribute. The device matrix shall be integrated into as-builts.
        c) In addition to door specific hardware the following tasks must also be identified and implemented:
            (a) Conduit Inspection (security and electrical)
            (b) Panel Inspection (security and electrical)
            (c) Third Party Door Hardware Inspection
            (d) Wiring/cable inspection (low voltage and line voltage)
            (e) Owner Programming
            (f) Pre-testing
            (g) Walkthrough
            (h) Acceptance Testing
            (i) Training
            (j) Sign off
    d. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.
14. Existing Conditions: Verify all existing conditions in the field to ensure compatibility with hardware specified in the Hardware Sets herein. Any discrepancies between the existing field

conditions and hardware specified shall be brought to the attention of the Architect immediately. Hardware Supplier shall not order any hardware until all discrepancies are rectified and the Architect grants written approval.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

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.
   1. Deliver each article of hardware in manufacturer's original packaging.
   2. Project Conditions:
      a. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
      b. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
   3. Protection and Damage:
      a. Promptly replace products damaged during shipping.
      b. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
      c. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
   4. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
   5. Deliver keys to Owner by registered mail or overnight package service.

1.8 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory 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 Section 28 1000 and Contractor's hardware 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 hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

F. Direct shipments not permitted, unless approved by Contractor.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
      a. Closers:
         a) Mechanical: 30 years.
         b) Electrified: 2 years.
         c) Exit Devices:
            (a) Mechanical: 3 years.
            (b) Electrified: 1 year.

d) Locksets:
(a) Mechanical: 10 years.
e) Continuous Hinges: Lifetime warranty.
f) Key Blanks: Lifetime

b. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.10 MAINTENANCE

A. Maintenance Tools:
1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approval of products from manufacturers indicated as "Acceptable Manufacturer" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

B. Scheduled Manufacturer

1.	Continuous Hinges	Ives (IVE)
2.	Flush Bolt	Ives (IVE)
3.	Surface Bolts	Ives (IVE)
4.	Coordinators	Ives (IVE)
5.	Locksets & Deadlocks	Schlage (SCH); Best (BES)
6.	Exit Devices & Mullions	Von Duprin (VON)
7.	Electronic Access Control Responsibility	Refer to Section 01 6190 Matrix of Building System
8.	Cylinders & Keying	Best (BES)
9.	Door Closers	LCN (LCN)
10.	Overhead Stops	Glynn-Johnson (GLY)
11.	Door Trim	Ives (IVE)
12.	Stops & Holders	Ives (IVE)
13.	Protection Plates	Ives (IVE)
14.	Silencers	Ives (IVE)
15.	Weatherseals	Zero (ZER)
16.	Thresholds	Zero (ZER)
17.	Magnetic Holders	LCN (LCN)
18.	Key Cabinets	Telkee (TEL)

19. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
20. 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.

2.2 MATERIALS

A. Fasteners
1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) 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 for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.
5. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled:
   a. 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. Use materials which match materials of adjacent modified areas.
   b. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
6. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
   a. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
7. Cable and Connectors: Hardwired Electronic Access Control Lockset and Exit Device Trim:
   a. Data: 24AWG, 4 conductor shielded, Belden 9843, 9841 or comparable.
   b. DC Power: 18 AWG, 2 conductor, Belden 8760 or comparable.
   c. Provide type of data and DC power cabling required by access control device manufacturer for this installation.
   d. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. 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.

2.3 CONTINUOUS HINGES

A. Aluminum Geared
   1. Manufacturers:
      a. Scheduled Manufacturer: Ives.
      b. Requirements:
         a) Provide aluminum geared continuous hinges conforming to ANSI A156.25, Grade 2.
         b) Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
         c) Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
         d) Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
         e) On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
         f) Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
         g) Install hinges with fasteners supplied by manufacturer.

h) 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

2.4 ELECTRIC POWER TRANSFER

A. Manufacturers:
1. Scheduled Manufacturer: Von Duprin EPT-10
2. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
3. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.5 POCKET PIVOT HINGES

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Requirements:
a. Provide pocket pivot hinges, where specified in hardware sets, non-handed with heavy duty ball bearings.
b. Provide three pocket pivot 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.

2.6 FLUSH BOLTS

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Requirements:
a. 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.

2.7 COORDINATORS

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Requirements:
a. 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.
b. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.8 CYLINDRICAL LOCKS - GRADE 1

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product: Schlage ND Series
2. Acceptable Manufacturers and Products: Best 9k Series
3. Requirements:
a. Provide cylindrical locks conforming to the following standards and requirements:
a) ANSI/BHMA A156.2 Series 4000, Grade 1.
b) UL 10C for 4'-0" x 10'-0" 3-hour fire door.

c) Florida Building Code (ASTM E330, E1886, E1996) and Miami Dade (TAS 201, 202, 203) requirements for hurricanes.

b. Cylinders: Refer to "KEYING" article, herein.

c. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
   a) Abusive Locked Lever Torque Test - minimum 3,100 inch-pounds without gaining access.
   b) Offset lever pull - minimum 1,600 foot pounds without gaining access
   c) Vertical lever impact - minimum 100 impacts without gaining access
   d) Cycle life - tested to minimum 10 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers.

d. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.

e. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.

f. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.

g. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.

h. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.

i. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

j. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
   a) Lever Design: Schlage Rhodes.
   b) Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.9 EXIT DEVICES

A. Manufacturers and Products:
   1. Scheduled Manufacturer: Von Duprin 98/35 series .
   2. Requirements:
      a. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
      b. Provide touch pad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
      c. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
      d. Touch pad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
      e. Provide rim devices with a dual cylinder or inside thumb turn cylinder option with a visual security indicator that identifies the trims locked/unlocked status of the door from the inside of the room. Indicator in unlocked state presents a 1/2 inch x 1/2 inch white metal flag with black icon at top of device head. Indicator in locked state has no flag present. Provide rim devices without the dual cylinder or inside thumb turn cylinder option capable of being retrofitted with the visual security indicator.

f. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.

g. 94/95 INPACT devices only: Recessed exit devices fully integrated within hollow metal doors.
   a) Projection: maximum 1-5/8 inch (41mm) in the neutral position and 1-1/4 inch (32mm) when fully depressed.
   b) Endcaps: die-cast aluminum with sloped design.
   c) Fasteners: include for surface mounting to recessed door prep and through bolting to device trim.
   d) Concealed Vertical Rod Devices: provide two-piece adjustable rods, 5/8 inch (16mm) throw latchbolt. Top and bottom latching standard with optional less bottom rod.
   e) Mortise Lock Devices: provide ¾ inch anti-friction latchbolt, field reversible

h. Provide exit devices with manufacturer's approved strikes.

i. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.

j. 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.

k. Provide cylinder dogging at non-fire-rated exit devices, unless specified less dogging.

l. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.

m. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
   a) Lever Style: Match lever style of locksets.
   b) Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

n. Provide UL labeled fire exit hardware for fire rated openings.

o. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

p. Provide electrified options as scheduled in the hardware sets.

2.10 POWER SUPPLIES

A. Refer to 01 6190 - Matrix of Building System Responsibility.

2.11 FINAL CYLINDERS and KEYING

A. Final key system shall be small format interchangeable cores by Best.

B. Coordinate a meeting with the owner to determine the key requirements for the building.

C. Final Cylinders to have the following;
   1. Core to have concealed key control stampings
   2. Final core to be installed by the owner's represented.
   3. Return all construction cores to the hardware supplier.
   4. Final biting list to be delivered to the owner no additional cost to the owner.
   5. Keys shall have the following;
      a. Material: Nickel silver; minimum thickness of .092-inch (2.3mm)
      b. Keys to be stamped with visual key control.

c. Key bow to have stamped “DO NOT DUPLICATE”.
d. Quantity: Furnish in the following quantities.
a) Change (Day) Keys: 3 per cylinder/core.
b) Final Control Keys: 3.
c) Master Keys: 6.

2.12 KEY CONTROL SYSTEM

A. Key Control System Manufacturers:
1. Scheduled Manufacturer: Telkee
2. Requirements:
a. 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.

2.13 DOOR CLOSERS

A. Manufacturer and Product: LCN 4010, 4110, and 4020 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 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.

2.14 DOOR TRIM

A. Manufacturers:
1. Scheduled Manufacturer: Ives.
2. Requirements:

a. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.

2.15 PROTECTION PLATES

A. Manufacturers:
1. Scheduled Manufacturer: Ives.
2. Requirements:
a. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
b. Sizes of plates:
a) Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
1. Scheduled Manufacturers: Glynn-Johnson
2. Requirements:
a. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
b. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
c. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
d. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Provide door stops at each door leaf:
a. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
b. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop

2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:
1. Scheduled Manufacturer: Zero.
2. Requirements:
a. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
b. Size of thresholds:
a) Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
b) Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width

c. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.19 SILENCERS

A. Manufacturers:
1. Scheduled Manufacturer: Ives.
2. Requirements:
a. Provide "push-in" type silencers for hollow metal frames.
b. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
c. Omit where gasketing is specified.

2.20 MAGNETIC HOLDERS

A. Manufacturers:
1. Scheduled Manufacturer: LCN.
2. Requirements:
a. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordination projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Wire magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.21 DOOR POSITION SWITCHES

A. Manufacturers:
1. Scheduled Manufacturer: Schlage
2. Requirements:
a. Provide recessed or surface mounted type door position switches as specified.
b. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.22 FINSHES

A. Finish: BHMA 626/652 (US26D); except:
1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. 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

3.1 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.

B. Existing Door and Frame Compatibility: 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where on-site modification of doors and frames is required prepare hardware locations in accordance with the following:
   1. Remove existing hardware being replaced, tag, and store according to contract documents.
   2. Field modify and prepare existing door and frame 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. Where doors are in rated assemblies, comply with NFPA 80 for restrictions on on-site door hardware preparation.
   5. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
   6. Ensure that walls and frames are square and plumb before hardware installation.
   7. The installer shall notify the architect, in writing, of all unacceptable condition that could affect the proper operation of the finish hardware.
   8. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
   9. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
   10. Existing frames and doors scheduled to receive new hardware: carefully remove existing hardware and turn over to Owner. Patch and fill wood frames and doors with solid wood stock or dowel material before cutting for new hardware. Do not reuse existing screw holes fill and re-pilot.
   11. Provide hole preparation in existing frames for door position switch.
   12. Contractor to fill/patch any old hardware preparations in existing frames that will no longer be used with new door/hardware. Contractor is responsible for any new mortises/cylindrical Hardware preparation to existing frame to accommodate new door and hardware.

3.3 INSTALLATION

A. Mounting Heights: 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   4. Install each hardware item in compliance with manufacturer’s instructions and recommendations, using only fasteners provided by manufacturer.
   5. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
   6. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
   7. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

8. Frame set into new or existing masonry wall and filled with mortar, drill and tap fasteners.
9. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
10. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
11. Lock Cylinders: Install construction cores to secure building and areas during construction period.
    a. Replace construction cores with permanent cores as indicated in keying section.
    b. Coordinate with owner for direction of the installation of permanent.
12. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
    a. Conduit, junction boxes and wire pulls.
    b. Connections to and from power supplies to electrified hardware.
    c. Connections to fire/smoke alarm system and smoke evacuation system.
    d. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
    e. Testing and labeling wires with Architect's opening number.
13. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
14. 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.
    a. Configuration: Provide [one power supply for each door opening][least number of power supplies required to adequately serve doors] with electrified door hardware.
15. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
16. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
17. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
18. 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.
19. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
20. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
21. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Provide a written report, with itemized confirmation, by hardware supplier listing all hardware that has not been installed correctly.

B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware.

C. The contractor shall retain, at their cost, a qualified independent Architectural Hardware Consultant, duly certified by the Hardware Industry and approved by the Architect, prior to Substantial Completion, to inspect the installation ans certify that the and installation has been furnished and installed in accordance with manufacturer's instructions and specified and is in proper working order. Consultant shall submit a written report.

1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 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. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
   2. Occupancy Adjustment: Approximately six (6) months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary 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.

3.7 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to 01 7900 - Demonstration and Training.

3.8 DOOR HARDWARE SCHEDULE

A. Provide hardware for each door to comply with requirements of this section and the below-listed scheduled sets.

B. It is intended that the following schedule includes complete items of door hardware necessary to complete the work. If a discrepancy is found in the scheduled hardware sets, such as a missing item, improper hardware for a frame, door or fire codes, provisions of the above-specifications shall govern.

C. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

D. 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.

E. ALL LOCK SETS: SHALL BE OPENABLE AT ALL TIMES FROM THE INSIDE (OCCUPIED SIDE) WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT.

3.9 HARDWARE SETS

Hardware Group No. 00

Provide each RU door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1 EA	PERMANENT CORE	BY OWNER	626	

BALANCE OF HARDWARE BY DOOR MANUFACTURER

Hardware Group No. 01

Provide each SGL door(s) with the following:

Description	Catalog Number	Finish	Mfr	
1 EA	CONT. HINGE	224HD	628	IVE
1 EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2 EA	PERMANENT CORE	BY OWNER	626	
1 EA	OH STOP	100S	630	GLY
1 EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1 EA	MOUNTING PLATE	4020-18	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	GASKETING	8144S-BK	S-Bk	ZER
1 EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 01A

Provide each SGL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	CONT. HINGE	224HD	628	IVE
1 EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2 EA	PERMANENT CORE	BY OWNER	626	
1 EA	SURFACE CLOSER	4011	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
1 EA	GASKETING	8144S-BK	S-Bk	ZER
1 EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 01B

Provide each SGL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	CONT. HINGE	224HD	628	IVE
1 EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2 EA	PERMANENT CORE	BY OWNER	626	
1 EA	SURFACE CLOSER	4111 EDA	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
1 EA	GASKETING	8144S-BK	S-Bk	ZER
1 EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 01C

Provide each SGL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	CONT. HINGE	224HD	628	IVE

1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	870AA	AA	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 02A

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL ENTRANCE LOCK	ND92HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	THRESHOLD	PER DETAIL	A	ZER
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02B

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL ENTRANCE LOCK	ND92HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 02C

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL ENTRANCE LOCK	ND92HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER

1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 03

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7830	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE MAGNETIC HOLD OPENS TO FIRE ALARM

Hardware Group No. 03A

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	SET	CONST LATCHING BOLT	FB52	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
2	EA	SURFACE CLOSER	4011	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7840	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
11	EA	MEETING STILE	328AA	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE MAGNETIC HOLD OPENS TO FIRE ALARM

Hardware Group No. 03B

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	SET	CONST LATCHING BOLT	FB52	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB1F	689	IVE

2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	MEETING STILE	328AA	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE HOLD OPENS INTO FIRE ALARM

Hardware Group No. 03C

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE HOLD OPENS INTO FIRE ALARM

Hardware Group No. 04

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	FIRE EXIT HARDWARE	9849-L-BE-F-06-LBL	626	VON
2	EA	SURFACE CLOSER	4011	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7830	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
2	EA	MEETING STILE	328AA	AA	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE MAG HOLD OPEN INTO FIRE ALARM SYSTEM.

Hardware Group No. 04A

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
2	EA	FIRE EXIT HARDWARE	98-L-BE-F-06	626	VON
1	EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN

2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	MULLION SEAL	8780N	N	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 04B

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-BE-F-06	626	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 04C

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-BE-F-06	626	VON
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 04D

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	FIRE EXIT HARDWARE	9849-L-BE-F-06-LBL	626	VON
2	EA	SURFACE CLOSER	4011	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
2	EA	MEETING STILE	328AA	AA	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

TIE MAG HOLD OPEN INTO FIRE ALARM SYSTEM.

Hardware Group No. 05

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 05A

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 05B

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 06

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB358	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	SURFACE CLOSER	4111 EDA	689	LCN

2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	870AA	AA	ZER
1	EA	MEETING STILE	328AA	AA	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	MOUNTING BRACKET	870SPB		ZER

Hardware Group No. 06A

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB358	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM LOCK	ND94HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	THRESHOLD	PER DETAIL	A	ZER
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 07

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	CD-98-EO	626	VON
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD	626	VON
3	EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
4	EA	PERMANENT CORE	BY OWNER	626	
2	EA	RECESSED DOOR PULL	BY DOOR MANUFACTURER	630	SPE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 08

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr

1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD-98-NL-OP-110MD	626	VON
1	EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	RECESSED DOOR PULL	BY DOOR MANUFACTURER	630	SPE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 08A

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 08B

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD-98-EO	626	VON
1	EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	RECESSED DOOR PULL	BY DOOR MANUFACTURER	630	SPE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 08C

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	OH STOP	100S	630	GLY

1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE

REQUIRE KEY TO ACCESS ROOF

Hardware Group No. 09

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4011 DEL	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 10

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD 8RO RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 11

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER

1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 11A

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB358	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	THRESHOLD	PER DETAIL	A	ZER
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 11B

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 11C

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD 8RO RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 11D

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE

1	EA	VANDL STOREROOM LOCK	ND96HD RHO LLL	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

NO INSIDE TRIM

Hardware Group No. 11E

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	328AA	AA	ZER
1	EA	MEETING STILE	328AA	AA	ZER
2	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	MOUNTING BRACKET	328SPB		ZER

Hardware Group No. 12

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD 8RO RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	THRESHOLD	PER DETAIL	A	ZER
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 13

Provide each DE door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
6	EA	POCKET PIVOT	91105F	630	IVE
2	EA	FIRE EXIT HARDWARE	9547-L-BE-F-LBR-06	626	VON

2	EA	SURFACE CLOSER	4003T WMS	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7840	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 13A

Provide each DE door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	FIRE EXIT HARDWARE	9547-L-BE-F-LBR-06	626	VON
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FIRE/LIFE FLOOR MAG	SEM7820	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
2	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 14

Provide each PR door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD-9849-EO	626	VON
1	EA	PANIC HARDWARE	CD-9849-NL-OP-110MD	626	VON
1	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
2	EA	RECESSED DOOR PULL	BY DOOR MANUFACTURER	630	SPE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	SEALS	BY DOOR MANUFACTUER		
1	EA	THRESHOLD	PER DETAIL	A	ZER

DOORS NORMALLY DOGGED DOWN

Hardware Group No. 15

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-2-06	626	VON
2	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	

1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 15A

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 15B

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-2-06	626	VON
2	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
2	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	870AA	AA	ZER
1	EA	DOOR BOTTOM	360AA6	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	MOUNTING BRACKET	870SPB		ZER

Hardware Group No. 16

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 17

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
1	SET	CONST LATCHING BOLT	FB52	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB1F	689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	MEETING STILE	328AA	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 17A

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL CLASSROOM SEC	ND95HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. 18

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	

BALANCE OF HARDWARE BY DOOR MANUFACTURER

Hardware Group No. 18A

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	

BALANCE OF HARDWARE BY DOOR MANUFACTURER

Hardware Group No. 19

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-06	626	VON
1	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	328AA	AA	ZER
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	RAIN DRIP	142A	A	ZER
1	EA	MOUNTING BRACKET	328SPB		ZER
1	EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE

Hardware Group No. 19A

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-06	626	VON
1	EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

Hardware Group No. CR01

Provide each SGL door(s) with the following:

	Qty	Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	ELECTRIC STRIKE	6211 FSE	630	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

1	EA	CARD READER	BY OWNER'S SECURITY VENDOR		
1	EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE
EA		POWER SUPPLY	BY OWNER'S SECURITY VENDOR	LGR	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RELEASE ELECTRIC STRIKE AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR03

Provide each PR door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	CONT. HINGE	224HD	628	IVE
1 EA	CONT. HINGE	224HD EPT	628	IVE
1 EA	POWER TRANSFER	EPT10 CON	689	VON
1 SET	CONST LATCHING BOLT	FB52	630	IVE
1 EA	DUST PROOF STRIKE	DP2	626	IVE
1 EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH
1 EA	PERMANENT CORE	BY OWNER	626	
1 EA	ELECTRIC STRIKE	6221 FSE CON	630	VON
1 EA	COORDINATOR	COR X FL	628	IVE
2 EA	SURFACE CLOSER	4111 EDA	689	LCN
2 EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2 EA	WALL STOP	WS406/407CVX	630	IVE
1 EA	GASKETING	8144S-BK	S-Bk	ZER
1 EA	MEETING STILE	328AA	AA	ZER
2 EA	DOOR SWEEP	328AA	AA	ZER
1 EA	THRESHOLD	PER DETAIL	A	ZER
1 EA	CARD READER	BY OWNER'S SECURITY VENDOR		
2 EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE
1 EA	POWER SUPPLY	BY OWNER'S SECURITY VENDOR	LGR	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RELEASE ELECTRIC STRIKE AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR04

Provide each SGL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1 EA	CONT. HINGE	224HD	628	IVE
1 EA	VANDL STOREROOM LOCK	ND96HD RHO	626	SCH

1	EA	PERMANENT CORE	BY OWNER	626	
1	EA	ELECTRIC STRIKE	6211 FSE	630	VON
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
1	EA	GASKETING	8144S-BK	S-Bk	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	CARD READER	BY OWNER'S SECURITY VENDOR		
1	EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE
1	EA	POWER SUPPLY	BY OWNER'S SECURITY VENDOR	LGR	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RELEASE ELECTRIC STRIKE AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR05

Provide each PR door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
2 EA	CONT. HINGE	224HD	628	IVE
1 EA	REMOVABLE MULLION	4854	689	VON
1 EA	FIRE EXIT HARDWARE	98-EO-F	626	VON
1 EA	FIRE EXIT HARDWARE	98-NL-OP-F-110MD	626	VON
2 EA	SFIC MORTISE CYLINDER	AS REQUIRED	626	SCH
1 EA	SFIC RIM CYLINDER	AS REQUIRED	626	SCH
3 EA	PERMANENT CORE	BY OWNER	626	
1 EA	ELECTRIC STRIKE	6111 FSE	630	VON
2 EA	RECESSED DOOR PULL	BY DOOR MANUFACTURER	630	SPE
2 EA	OH STOP	100S	630	GLY
2 EA	SURFACE CLOSER	4111 EDA	689	LCN
2 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	SEALS	BY DOOR MANUFACTUER		
1 EA	MULLION SEAL	8780N	N	ZER
1 EA	THRESHOLD	PER DETAIL	A	ZER
1 EA	CARD READER	BY OWNER'S SECURITY VENDOR		
2 EA	DOOR CONTACT	BY OWNER'S SECURITY VENDOR	WHT	SCE
1 EA	POWER SUPPLY	PS902 900-2RS	LGR	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RELEASE ELECTRIC STRIKE AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. EXST - HARDWARE EXISTING TO REMAIN

GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. High Performance Architectural Insulating glass units.

B. Obscure glass

C. Laminated safety glass.

D. Laminated glass.

E. Spandrel glass.

F. Fire rated safety glass.

G. Insulated laminated glass

H. Plastic sheet glazing units.

I. Glazing compounds and accessories.

1.3 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites installed in doors and borrowed lites.

C. Section 08 1416 - Flush Wood Doors: Glazed lites installed in doors.

D. Section 08 1613 - Fiberglass Doors and Aluminum Frames: Glazed lites installed in doors and borrowed lites.

E. Section 08 4313 - Aluminum-Framed Entrances and Storefront. Glazing installed in storefront.

F. Section 08 4413 - Glazed Aluminum Curtain Walls. Glazing installed in curtain wall assembly.

G. Section 08 5113 - Aluminum Windows: Glazing installed in windows..

H. Section 08 5123 - Fire Rated Steel Windows: Glazing furnished and installed by window manufacturer.

1.4 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Sealed Insulating Glass Unit Surface Designations:

1. Surface 1 - Exterior surface of the outer glass lite.
2. Surface 2 - Interspace surface of the outer glass lite.
3. Surface 3 - Interspace surface of the inner glass lite.
4. Surface 4 - Interior surface of the inner glass lite.

D. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

E. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.5 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).

D. ASTM C1036 - Standard Specification for Flat Glass; 2016.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.

H. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

J. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.

K. ASTM E 2188 – Standard Test Method for Insulating Glass Unit Performance and Evaluation.

L. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

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

N. GANA (SM) - GANA Sealant Manual; 2008.

O. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.

P. ICC (IBC) - International Building Code; 2018.

Q. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.

R. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

S. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

T. New York State Section 2406 Safety Glazing.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for each glass product and glazing material indicated. Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 12 by 12 inch (300 by 300 mm) in size of glass units.

E. Samples: Submit 6 inch (150 mm) long bead of glazing sealant, color as selected.

F. 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.

G. Certificate: Certify in writing and signed by manufacturers that products of this section meet or exceed specified requirements.

H. 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.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Sustainable Design Certification: Glass shall be Cradle to Cradle Certified™, minimum Silver Level, Cradle to Cradle Innovation Institute.

B. Perform Work in accordance with GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.

C. 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 Manufacturers Alliance

D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, Insulating Glass Manufacturers 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 square feet (sf) (0.84 sq. m) in area are required to be Category II materials

E. Where glazing units, including Kind FT glass, are specified in Part 2 articles for glazing lites more than 9 sf in area, provide glazing products that comply with Category II materials, and for lites 9 sf or less in area, provide glazing products that comply with Category I or II materials.

F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum Ten (10) years of documented experience and meet ANSI / ASQC Q9002 1994.

G. Fabricator Qualifications: Manufactured Certified as acceptable to the manufacturer

H. Installer Qualifications: Company specializing in performing work of the type specified and with at least five (5) years documented experience and approved by manufacturer.
   1. Manufacture shall provide field inspection of the installation.
   2. 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).

I. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type:
   1. Insulating glass.

J. Source Limitations for Laminated Glass: Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.

K. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
   1. Insulating Glass products are to by permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
      a. Insulating Glass Certification Council (IGCC).
      b. Single Source fabrication responsibility: All fabrication processes, including Low E and reflective coatings, insulating, laminating, silkscreen, and tempering, shall be fabricated by a single Fabricator.

L. Insulating Glass products are to by permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
   1. Insulating Glass Certification Council (IGCC).

2. Single Source fabrication responsibility: All fabrication processes, including Low E and reflective coatings, insulating, laminating, silkscreen, and tempering, shall be fabricated by a single Fabricator.

M. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.8 MOCK-UPS

A. See Section 01 4000 - Quality Requirements and individual sections for additional mock-up requirements.

B. Provide on-site glazing mock-up with the specified glazing components.

C. Locate where directed.

D. Mock-ups may remain as part of the Work.

1.9 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. For insulating glass units that will be exposed to substantial altitude changes, comply with insulating glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including replacement of failed units.

D. Security Glass: 10 year warranty against delamination and 10 year warranty against seal failure.

E. 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 deteriorate 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 (5) from date of Substantial Completion

F. Polycarbonate Sheet Glazing: Provide a five (5) year manufacturer warranty to include coverage for breakage, coating failure, abrasion resistance, including providing products to replace failed units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Glass Fabricators:

1. Basis of Design For Insulated Glass: Vitro Architectural Glass, Vitro Glass Technology Center, 400 Guys Run Rd., Cheswick, PA 15024. ASD. Toll Free Tel: (800) 377-5267. Fax: (800) 367-2986. Web: <http://www.vitroglazings.com.
2. For Security and Specialty Glazing refer to individual glazing types.
3. Substitutions: Refer to Section 01 2500 - Substitution Procedures

B. Laminated Glass Manufacturers:

1. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: www.viracon.com.
2. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
3. Substitutions: Refer to Section 01 2500 - Substitution Procedures

C. Insulated Security Glass Fabricators:

1. SG-4 as manufactured by LTI Smart Glass, Inc., 14 Federico Drive, Pittsfield, MA 01201, Pittsfield, MA 01201.
2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

D. Polycarbonate Manufacturers:
1. General Electric, Inc.
2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Design Pressure:
a. Positive Design Pressure: 40 psf.
b. Negative Design Pressure: 40 psf.
2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
3. 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
4. Probability of Breakage for Vertical Glazing: 0% lites per 1000 for lites set vertically or not more than 15 degrees off vertical
a. Wind Load Duration: Short duration, as defined in ASTM E 1300 .
5. Probability of Breakage for Vertical Glazing: 0% lites per 1000 for lites set vertically or not more than 15 degrees off vertical
a. Wind Load Duration: Short duration, as defined in ASTM E 1300
6. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
7. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other sections.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Refer to window, storefront, and glazed aluminum curtain wall specification sections for overall thermal transmittance requirements.

2.3 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
b. For uncoated glass, comply with requirements for Condition A.
c. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
4. Sputter-Coated Float Glass: Heat-Strengthened and Fully Tempered Types: With metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and complying with other requirements specified.

B. Fire-Resistance-Rated Glass Manufacturers: Provide products as required to achieve indicated fire-rating period.
1. Anemostat; (310) 835-7500; door@anemostat.com.
2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

C. Laminated Glass Manufacturers: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.

D. Insulating Security Glass Manufacturers:
1. Product : School Guard Glass SG4 IGU as manufactured by LTI Smart Glass, Inc; 14 Federico Drive, Pittsfield, MA 01201, www.LTISmartGlass.com.
2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

2.4 INSULATING GLASS UNITS GENERAL

A. Manufacturers:
1. Vitro Architectural Glass (formerly PPG Glass); Solarban 60: www.vitroglazings.com/#sle.
2. Substitutions: Refer to Section 01 2500 - Substitution Procedures

B. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Edge Seal:
   a. Single-Sealed System: Provide silicone, polysulfide, or polyurethane sealant as seal applied around perimeter.
4. Color: Black.
5. Purge interpane space with dry air, hermetically sealed.

C. Space between lites filled with gas as required to maintain Thermal Transmittance Overall U-value.

D. Total Thickness: 1 inch (25.4 mm).

E. Solar Heat Gain Coefficient (SHGC): 0.39, nominal.

F. Spacer Color: Black.

G. Edge Seal:
1. Single-Sealed System: Provide silicone, polysulfide, or polyurethane sealant as seal applied around perimeter.
2. Color: Black.
3. Purge interpane space with dry air, hermetically sealed.

2.5 GLASS TYPES

A. **Insulated Glazing**
1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
2. Inboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick.
   a. Glass: Clear.

3. Total Thickness: 1".
4. Use for all window and storefront applications.
5. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

B. **Insulated Security Glazing:**
1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
   b. Tint: Clear.
2. Inboard Lite: School Guard Glass SG4 IGU, 1/4 inch (6.4 mm) thick.
   a. Tint: Clear.
   b. Size : As shown on drawing.
   c. Thickness: 1/4".
   d. Ratings: UL 972; 5-aa1 rated for 6 minutes.
   e. BR Level 2 low spall.
   f. UL 972
   g. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch (0.762 mm) thick, minimum.
3. Total Thickness: 1".
4. Use for all exterior doors, sidelites, and transoms and as indicated on drawings.
5. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

C. **Insulated Laminated Glazing:**
1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
   b. Tint: Clear.
2. Inboard Lite: Laminated Safety Glass, 1/4 inch (6.4 mm) thick.
   a. Tint: Clear.
3. Total Thickness: 1"
4. Use for curtain wall and as indicated on drawings.
5. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

D. **Insulated Spandrel Glazing:**
1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
   b. Tint: Clear.
2. Inboard Lite: Laminated Safety Glass, 1/4 inch (6.4 mm) thick.
   a. Tint: Clear.
   b. Sandblast #3 surface.
   c. Opacifer Ceramic frit on #4 surface. Color as selected by the Architect.
3. Total Thickness: 1"
4. Use for where indicated on drawings.
5. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

E. **Dual Glazing: Insulated and Polycarbonate Unit Glazing:**
1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
   b. Tint: Clear.
2. Inboard Lite: Fully tempered 1/4 inch (6.4 mm) thick.

a. Tint: Clear.

3. Total Thickness Insulated Glass Unit: 1"
4. Polycarbonite Interior Glazing:
   a. Manufacturers:
      a) General Electric. Lexan MR10
   b. Tint: Clear.
   c. Thickness : 3/8".
5. Use for all windows where dual glazing indicated on drawings.
6. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

F. **Monolithic Spandrel Glazing**

1. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Tint: Clear.
   b. Opacifer Ceramic frit on #2 surface. Color as selected by the Architect.

G. **Monolithic Interior Non-Rated Vision Glazing:**

1. Applications: As scheduled.
2. Glass Type: Laminated float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), nominal.
5. Interlayer: Polyvinyl butural (PVB) Thickness as required to meet performance requirements.
6. Use for all non-rated interior doors, sidelights and transoms indicated on drawings.

H. **Fire Rated Safety Interior Vision Glazing**

1. Conform to Underwriters Laboratories, Inc. Fire Tests of Door Assemblies and the following:
2. Manufacturer: Anemostat; (310) 835-7500; door@anemostat.com
3. Firelite Plus, clear ceramic laminated with 2 pieces of PREMIUM FireLite and a proprietary interlayer specialty high impact fire rated glazing material.
   a. Thickness: 5/16”
   b. U Value: 0.40
   c. Weight: 3.8-lbs/sq. ft.
   d. Sound Transmission Rating: 38 STC
   e. Glazing materials shall be optically clear, colorless and free from usual distortion.
   f. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory fire rating period and safety glazing standards.
   g. Glazing material installed shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80 and:
   h. ANSI Z97.1
   i. CPSC 16 CFR 1201, Category II 400 ft.lbs.
   j. Glazing shall be installed in a rated framing system meeting ASTM E2010-01, NFPA 257, UL 9, UBC 7-4 or CAN4-S106 and ASTM E2074-00, NFPA 252, UL 10b, UBC 7-2 or CAN4-S104
4. Use for all interior vision panels in fire rated doors, sidelites adjacent to fire rate doors, glass within 18" above the floor., and glass in fire rated partitions

I. **Obscure Glazing:**

1. PPG Fully tempered conforming to to the following:
   a. Heavily patterned obscure glazing design.
      a) Tint: Clear.
      b) Pattern: #62.

b. Use where indicated on drawings.

2. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

2.6 GLAZING COMPOUNDS

A. As reccommended by the manufacturer.

2.7 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

1. Width: As required for application.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements

2.9 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements and individual sections requirements.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 GLAZING SYSTEM:

A. Manufacturer's standard factory-glazing system that produces weather tight seal. Refer to Section 08 1113 Hollow Metal Doors and Frames, Section 08 1416 Flush Wood Doors, Section 08 1613 Fiberglass Doors and Aluminum Frames, Section 08 4313 Aluminum Framed Storefronts, Section 08 4413 Glazed Aluminum Curtain Walls, and Scetion 08 5113 Aluminum Windows.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

C. Monitor and report installation procedures and unacceptable conditions.

3.6 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

C. Remove non-permanent labels immediately after glazing installation is complete.

D. Clean glass and adjacent surfaces after sealants are fully cured.

E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.7 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

3.8 SCHEDULE

A. Refer to door and window schedule and drawings for location and/or requirements.

END OF SECTION

LOUVERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Louvers, frames, and accessories.

B. Foam sealant for filling perimeter of louver space..

1.3 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry for brick veneer.

B. Section 05 4000 Cold-Formed Metal Framing: Prepared exterior wall opening.

C. Section 07 2500 - Weather Barriers: Sealing frames to weather barrier installed on adjacent construction.

D. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 23 0400 - Sheetmetal Work and Relatede Accessories: Ductwork attachment to louvers, and blank-off panels

1.4 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

D. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

D. Samples: Submit two samples 2 by 2 inches (50 by 50 mm) in size illustrating finish and color of exterior and interior surfaces.

E. Test Reports: Independent agency reports showing compliance with specified performance criteria.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum five (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

D. Welding: Qualify procedures and personnel according AWS D1.2, "Structural Welding Code--Aluminum."

E. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.

1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fixed Louvers:

1. Airolite Company, LLC: www.airolite.com/#sle.

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf (1.2 kPa) without damage or permanent deformation.
2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers: Horizontal blade, extruded aluminum construction.

1. Free Area: 54.2, minimum.
2. Static Pressure Loss: 0.12 inch wg maximum per square foot (square meter) of free area at velocity of 700 fpm, when tested in accordance with AMCA 500-L.
3. Blades: Drainable.
4. Frame: 2 inches (50 mm) deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
5. Aluminum Thickness: Frame 12 gage, 0.0808 inch (2.05 mm) minimum; blades 12 gage, 0.0808 inch (2.05 mm) minimum.
6. Product: Use the following : Airolote K6772 with flange at wall louvers.
   a. Substitutions: See Section 01 2500 Substitution Procedures.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

2.4 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

1. Manufacturers:
   a. PPG Metal Coatings; Duranar: www.ppgmetalcoatings.com/#sle.
2. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss as indicated on drawings.

B. Color: As selected from manufacturer's standard colors.

2.5 ACCESSORIES

A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch (38 mm) thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct. Coordinated with HVAC Contractor.

B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

C. Bird Screen: Interwoven wire mesh of steel, 14 gage, 0.0641 inch (1.63 mm) diameter wire, 1/2 inch (13 mm) open weave, diagonal design.

D. Insect Screen: 18 x 16 size aluminum mesh.

E. Window and Door Joint Seal: Polyurethane-based joint filler:
   1. UL Classified.
   2. Product: "Great Stuff" as manufactured by Dow Chemical.
      a. "Gaps and Cracks: for joints less than 1".
      b. "Big Gap Filler" for joint over 1".
   3. Use for all filling all spaces and joints around louvers located on exterior walls.

F. Sealant: Type, as specified in Section 07 9200 - Joint Sealants.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Coordinate with installation of flashings by others.

C. Install louvers level and plumb.

D. Set sill members and sill flashing in continuous bead of sealant.

E. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

F. Secure louver frames in openings with concealed fasteners.

G. Fill all exterior spaces and joint between windows and doors solid with foam in accordance with manufacture's instructions.
   1. Cut back to permit application of joint sealant.

H. Install perimeter sealant and backing rod in accordance with 07 9200 - Joint Sealants.

I. Coordinate with installation of mechanical ductwork.

3.3 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.
B. Metal stud wall framing.
C. Metal channel soffit/ceiling framing.
D. Furring channels.
E. Resilient channels.
F. Neoprene Spring hangers.
G. Metal Trim
H. Cementitious backing board.
I. Gypsum wallboard.
J. Joint treatment and accessories.
K. Water-resistive barrier.
L. Interior Vapor Barrier

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
B. Section 05 4000 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
C. Section 07 9513 - Expansion Joint Cover Assemblies.
D. Section 06 1000 - Rough Carpentry: Wood blocking.
E. Section 07 2100 - Thermal Insulation: Acoustic insulation.
F. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
G. Section 07 8400 - Firestopping: Top-of-wall assemblies and penetrations at fire rated walls.
H. Section 07 9200 - Joint Sealants: Acoustic sealant.
I. Section 09 2662 - Gypsum Sheathing.
J. Section 09 3000 - Tiling.

1.4 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
D. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
E. ANSI A108.11> ANSI A108/A118/A136.1 - American National Standard for Interior of Cementitious Backer Units; 2010 (Revised).

F. ANSI A118.9>ANSI A108/A118/A136.1 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

H. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

I. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).

J. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).

K. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

L. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.

M. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.

N. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

O. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

P. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

Q. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.

R. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017a.

S. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

T. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

U. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.

V. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.

W. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.

X. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

Y. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

Z. ASTM E413 - Classification for Rating Sound Insulation; 2016.

AA. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.

AB. GA-600 - Fire Resistance Design Manual; 2015.

AC. ICC (IBC) - International Building Code; 2018.

AD. UL (FRD) - Fire Resistance Directory; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Sound Transmission Loss Test Report per ASTM E90-99 for acoustic hangers and clips. Test reports must be from an independent laboratory accredited by the National Institute of Standards and Technology (NIST).

F. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches (300 by 300 mm) in size, illustrating finish color and texture.

1.6 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

1.7 REGULATORY REQUIREMENTS

A. Refer to Section 01 4100 - Regulatory Requirements.

1. Conform to New York StateBuilding and Fire Code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:

1. Acoustic Attenuation: As indicated on drawings calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:

1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:

1. Fire Rated Partitions: Rating as indicated on the drawings..
2. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
3. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
4. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:

1. Marino: www.marinoware.com.
2. Substitutions: 01 2500 - Substitution Procedures

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf (L/120 at 240 Pa).

1. Studs: "C" shaped with flat or formed webs with knurled faces.
   a. Minimum Base Metal Thickness: 0.0312 (20 gauge).
   b. Depth: As indicated.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C-shaped.
4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).

C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
4. Deflection and Firestop Track:
   a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
   b. Products:
      a) Clark Dietrich," MaxTrak Slotted Deflection Track" or approved equal.
         (a) Minimum 20 ga. x 2-1/2" leg.
         (b) Non-structural.
   c. Substitutions: 01 2500 - Substitution Procedures
5. Flute Cover:
   a. Corrugated strap for horizontal use to span flute areas of unprotected metal decks.
   b. Products:
      a) Clark Dietrich," (FC) Flute Cover.
         (a) Minimum 20 ga.
         (b) Non-structural.
      b) Refer to Section 05 3000 Metal Deck for deck types,

F. Suspended Ceiling and Soffit Framing:
1. Components, General: Comply with ASTM C 754 for conditions indicated.
2. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
3. Hangers:
   a. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
   b. Rod Hangers: ASTM A 510, mild carbon steel.
      a) Diameter: 1/4-inch.
      b) Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
4. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch-wide flange, with ASTM A 653, G40 (Z120), hot-dip galvanized zinc coating.
   a. Depth: 1-1/2" unless otherwise indicated.

5. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
   a. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, 3/4 inch deep.
   b. Steel Studs: ASTM C 645.
      a) Minimum Base Metal Thickness: As indicated.
      b) Depth: As indicated.
6. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a) Manufacturer's standard furring systems.
   b. Main Beam: Shall be double-web construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (per ASTM A653).
      a) HD8901: 1-1/2 inch web height, prefinished 15/16 inch flange with minimum G40 hot dipped galvanization.
   c. Primary Cross Tees: Shall be double-web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40 or G90 per ASTM A653), web height 1-1/2 inch with rectangular bulb and prefinished 1-1/2" knurled flange.
   d. Secondary Framing Cross Tees : Shall be double web steel construction (minimum 0.0179 inch prior to protective coating), hot dipped galvanized (minimum G40, web height 1-1/2 inch rectangular bulb and 15/16 inch flange (XL8341)
   e. Hat Furring Channel, HD8940: Shall be 48 inch x 1-3/8 inch x 7/8 inch, hot dipped galvanized steel (minimum G40 per ASTM A653); compatible with HD8901 and HD8906 main beams.
   f. Wall Molding:
      a) HD7859: Hot dipped galvanized (minimum G40), hemmed angle molding, 1-1/4 inch height with 1-1/4 inch flange.
   g. Clips:
      a) MBAC - Main Beam Adapter Clip
      b) DWACS, DW50, DW58 - Drywall Attachment Clip for transitions to acoustical ceilings
      c) XTAC - Cross Tee Adapter Clip
   h. Screws for wallboard application shall be bugle head screws in accordance with thickness of material used.
7. Structural Classification:
   a. Main Beam shall be heavy duty per ASTM C 635.
   b. Classification can require wires to be closer together for additional loading when used to support double layer gypsum, verticals, slopes, domes, half barrels, circles, soffits, canopies, and step conditions which call for loading or unusual designs and shapes in drywall construction. Using cross tees in the construction of circles, barrels, etc. is common in order to hold the radius.
   c. Deflection of fastening suspension system supporting light fixtures, ceiling grilles, access doors, verticals and horizontal loads shall have a maximum deflection of 1/360 of the span.

2.3 ACOUSTIC HANGERS AND CLIPS

A. Deck Suspended Ceiling Hangers:
   1. The isolation hanger shall be a combination high-deflection steel spring in series with a resilient, molded neoprene noise and vibration isolation pad. The steel spring and neoprene pad shall be incorporated into a stamped steel hanger assembly that resiliently supports the isolated ceiling.

2. The hanger assembly bracket shall be designed to allow fifteen (15) degrees of vertical alignment of the suspension member without making metal-to-metal contact between the suspension and hanger assembly members. The hanger bracket shall be designed with an integral spring pre-load bracket selected to minimize change in elevation once a load is applied to the hanger and to hold the isolator assembly steady during attachment of gypsum board. The hanger assembly bracket shall consist of a leveling rod with an attached channel carrier designed to accept 1-1/2" x 1/2", 16-gauge cold-rolled steel. The isolation hanger deflection shall be selected by the manufacturer to provide a maximum natural frequency of 4.4 Hz. The steel spring element shall have a minimum Kx to Ky of 1 at its 1" rated deflection
3. Resiliently suspended ceilings shall be separated where non-isolated building components abut. Isolation material shall be 3/8" thick Model SRP perimeter isolation board. Model SRP shall not be penetrated by nail, screw, or similar fastener. Model SRP shall be adhered to non-isolated structure. Resiliently-suspended ceiling shall be constructed against Model SRP. Model SRP shall be sealed using resilient, non-hardening caulk.
4. Product: Model ICC as manufactured by Kinetics Noise Control, Inc. Dublin, Ohio.
    a. Substitutions: 01 2500 - Substitution Procedures

B. Sound Isolation Wall and Ceiling Clips.
1. Vertical Load capacity. Clips shall have sufficient capacity to support wall or ceiling weights as constructed. In a vertical load test comparable to a ceiling installation, the clip shall have a minimum design load capacity of 36 lbs. using 25 gauge furring channel. The minimum design load capacity when using 22 gauge furring channel shall be 48 lbs. Design Load capacity shall be based on a safety factor where the load to failure, defined as pullout of the channel from the clip, is a minimum 2.5 times the allowable maximum Design Load. Anchors for attachment of the clips to the substructure shall be selected to support wall and/or ceiling weights at each clip.
2. The isolation clips shall consist of a rubber element into which a standard galvanized steel furring channel, 7/8 in. x minimum 25 gauge, is captured. The channel legs snap fit into the rubber element without any metal-to-metal or other rigid contact with building elements.
3. The isolation clip is attached to the wall/ceiling framing or other structural substrate through galvanized steel brackets on each side of the rubber isolation element. The brackets shall be of sufficient strength to carry the wall or ceiling weight without bending or failure.
4. Product: Model Iso-Max Sound Isolation Clips, as manufactured by Kinetics Noise Control, Dublin, Ohio.

2.4 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
1. Georgia-Pacific Gypsum: www.gpgypsum.com.
2. National Gypsum Company: www.nationalgypsum.com/#sle.
3. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    a. **Mold resistant board is required at all locations.**
3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Thickness:
    a. Vertical Surfaces: As indicated on drawings.
    b. Soffits and Ceilings: 1/2 inch (13 mm).

C. Abuse Resistant Wallboard:
1. Application: Face layer of all partitions unless noted otherwise.

2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
7. Type: Fire resistance rated Type X, UL or WH listed.
8. Thickness: 5/8 inch (16 mm).
9. Microbial Resistance (ASTM D6329, EPA 12-week protocol): Will not support microbial growth.
10. R-Value (ASTM C518): 0.67.
11. Humidified Deflection (ASTM C473, ASTM C1658): Not more than 1/8 inch.
12. Hardness, Core, Edges, and Ends (ASTM C473, ASTM C1396, ASTM C1658): Not less than 15.
13. Water Absorption (ASTM C630, ASTM C1396, ASTM C1658): Less than 5 percent of weight.
14. Edges: Tapered.
15. Products:
    a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant.
    b. Substitutions: See Section 01 2500 Substitution Procedures.

D. Cementitious Backing Board For Wet Areas:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds, shower ceilings, and toilet areas.
2. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    a. Thickness: 1/2 inch (12.7 mm).
    b. Products:
        a) National Gypsum Company: www.nationalgypsum.com.
        b) USG Corporation: www.usg.com/#sle.

E. ~~Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to~~ minimize joints in place; ends square cut.
1. Application: Soffits and ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch (13 mm).
3. Edges: Tapered.
4. Products:
    a. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
    b. Substitutions: 01 2500 - Substitution Procedures

F. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) wide, beveled long edges, ends square cut.
1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Products:
    a. American Gypsum Company; M-Bloc Shaft Liner.
    b. Substitutions: 01 2500 - Substitution Procedures

2.5 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 2100.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
1. Products:

a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
b. Substitutions: 01 2500 - Substitution Procedures

C. Interior Vapor Barrier: Polyethylene Film: ASTM D2103, 4 mil, 0.004 inch (0.102 mm) thick, clear.
1. Applied between studs and gypsum board.

D. Metal Edge Trim: Reveal Column, 6063T aluminum as manufactured by Fry Reglet Corporation.
1. Model: Drywall DRWT, reveal joint WRM-75-75
2. Size: 3/4"reveal width x 3/4" reveal depth x diameter as shown on drawings.
3. Finish: Clear anodize aluminum.

E. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel, unless noted otherwise.
1. Rigid Corner Beads: Low profile, for 90 degree outside corners.
2. L-Trim with Tear-Away Strip: Sized to fit the thickness gypsum wallboard.
3. Expansion Joints:
a. Type: V-shaped metal with factory-installed protective tape.

F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Mold resistant and asbestos free.
3. Ready-mixed vinyl-based joint compound.

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

H. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion resistant.

I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

J. Utility angle: 2"x 2" 20 ga. for attachments of intersection framing and right angle corner enclosures.

K. Flat straps: 6", 16 ga. use for stud bridging.

L. Adhesive for Attachment to Wood, ASTM C557 and Metal

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.3 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Provide metal Bracing: at midpoint up to 8' 0"; at third point over 8'-0".

C. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Level ceiling system to a tolerance of 1/1200.
2. Install bracing as required at exterior locations to resist wind uplift.

D. Studs: Space studs at 16 inches (400 mm) on center, unless shown otherwise
   1. Extend partition framing to structure in all locations.
   2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

E. **Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs minimum 16 gauge**.

F. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches (100 mm) from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches (80 mm) on center.
   1. Orientation: Horizontal.
   2. Spacing: As indicated.

G. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, casework, toilet accessories, and hardware. Comply with Section 06 1000 for wood blocking.

H. Suspended Ceiling and Soffits: Space framing and furring members as indicated.

3.4 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.5 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. Installation on Metal Framing: Use screws for attachment of gypsum board.

G. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.6 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.7 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
   2. Taping, filling and sanding is not required at base layer of double layer applications.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.8 FIRE RATED WALL MARKING AND IDENTIFICATION

A. For all walls or partitions indicated to be fire rated, or smoke rated, where there is an accessible concealed floor, ceiling or attic space adjacent to said wall. Contractor shall permanently mark with signs or stenciling within he concealed space, in accordance with IBC 703.7 in concealed spaces.
   1. Identifications shall be located within 15 feet of the end of each wall or partition and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
   2. Identifications shall include lettering not less than 3 inches in height with a minimum 3/8 inch stroke width in a contrasting color incorporating the wording " FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS".

3.9 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.10 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.

B. Level 2: Utility areas and areas behind cabinetry.

C. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.

D. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

END OF SECTION

GYPSUM SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section includes:
   1. Gypsum sheathing attached to steel framing members in exterior walls and ceilings (behind exterior finish).

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section - 05 4000 - Cold-Formed Metal Framing.
   2. Section - 07 2500 - Weather Barriers.
   3. Section - 07 4113 - Metal Roofing.
   4. Section - 07 5323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM) for gypsum based cover board and sheathing.
   5. Section - 09 2116 - Gypsum Board Assemblies for furring.

1.3 DEFINITIONS:

A. Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

1.4 SUBMITTALS:

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
   1. Product data for each grade of gypsum sheathing indicated.
   2. Product data for air/moisture resistant barrier and tape.
   3. Research reports or evaluation reports from the model code organization acceptable to authorities having jurisdiction evidencing compliance of air-infiltration barrier with building code in effect for Project.
   4. Sample: 6” x 6” sheathing.

1.5 QUALITY ASSURANCE:

A. Fire-Test-Response Characteristics: Where gypsum sheathing is part of fire-resistance-rated assemblies, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Resistance Ratings: As indicated by reference to GA File Nos. in GA 600 "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Single-Source Responsibility: Obtain gypsum sheathing for Project from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Deliver gypsum sheathing board and related materials in original packages bearing brand name and identification of manufacturer.

B. Store gypsum sheathing board so that it is protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Neatly stack gypsum sheathing boards flat on leveled supports off the ground under protective covering.

C. Handle gypsum sheathing board to prevent damaging edges, ends, backs, or faces.

1.7 SEQUENCING AND SCHEDULING:

A. Sequence installing gypsum sheathing board with installing exterior cladding to comply with requirements indicated below:

B. Do not leave gypsum-sheathing board exposed to weather for more than 1 month or for more than 6 months if protected as indicated in Part 3 "Protection" article.

PART 2 - PRODUCTS

2.1 GYPSUM SHEATHING BOARD:

A. Glass-Mat Gypsum Board: Gypsum board designed as an exterior substrate for a weather barrier, consisting of a noncombustible water-resistant core, essentially gypsum, surfaced with glass mats on face and back, partially or completely embedded in core, and with unsurfaced square edges. Comply with ASTM C 1177 and requirements indicated below:

1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
2. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Core Type: Type X.
5. Thickness: 5/8 inch (16 mm),unless indicated otherwise
6. Edges: Square.
7. Size: 4 feet by 8 feet
8. Use: All gypsum sheathing applications.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Dens-Glass Gold Fireguard Exterior Guard as manufactured by Georgia-Pacific Corp or equivalent.

C. Accessory Materials:

1. Fasteners: Type S-12, minimum 1”, stainless steel drill screws to attach to metal framing.

D. Substitutions: 01 2500 - Substitution Procedures

2.2 WEATHER RESISTIVE BARRIER

A. Refer to Section 07 2500 - Weather Barriers

B. Furnish and install air barrier/weather resistant barrier over exterior wall sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing.

PART 3 - EXECUTION

3.1 GYPSUM SHEATHING BOARD

A. Preparation: Examine subframing; verify that surface of framing and furring members to receive sheathing does not vary more than 1/4" from the placement of faces of adjacent members.

B. Installation: General: Install gypsum sheathing to comply with manufacturer's instructions, GA-253, and the following:

1. Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch setback where non-load-bearing construction abuts structural elements.
2. Coordinate sheathing installation with flashing and joint sealant installation so that these combined materials are installed in the sequence and manner that prevents exterior moisture from passing through completed exterior wall assembly.
3. Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards but do not cut into face paper.
4. Do not bridge building expansion joints with gypsum sheathing; cut and space edges to match

a. spacing of structural support elements.

5. Install sheathing with gold side out.

6. Install gypsum-sheathing boards with edges centered over flanges of steel studs or furring. Abut ends and edges of each board with those of adjoining boards. Screw-attach boards at perimeter and within field of board to each steel stud as follows:
   a. Metal framing: Fasten sheathing to metal framing with screws spaced 8" o.c.at perimeter where there are framing supports; and 8" o.c. along intermediate framing in field.
   b. Locate fasteners minimum 3/8" from edges and ends of sheathing panels.
   c. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink.
   d. Use maximum lengths possible to minimize number of joints.
   e. Metal framing: Fasten sheathing to metal framing with screws spaced 8" o. c. at perimeter

3.2 WEATHER RESISTIVE BARRIER

A. Refer to Section 07 2500 - Weather Barriers.

3.3 PROTECTION:

A. Protect cutouts, corners, and joints in the sheathing by filling with a flexible sealant or by applying sheathing tape recommended by sheathing manufacturer at the time sheathing is applied.

END OF SECTION

TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Stone thresholds.

D. Non-ceramic trim.

1.3 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

B. Section 09 6725 - Epoxy Resin Flooring.

1.4 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.

1. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
2. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
3. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
4. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
5. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
6. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
7. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
8. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
9. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
10. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 2008 (Reaffirmed 2013).
11. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2012.

B. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2017.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.

E. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches (457 by 457 mm) in size illustrating pattern, color variations, and grout joint size variations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

F. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Tile: 10 square feet (1 square meters) of each size, color, and surface finish combination.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.7 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.

1. Minimum size of mock-up is indicated on drawings.
2. Approved mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

PART 2 PRODUCTS

2.1 TILE

A. Manufacturers: All products by the same manufacturer.

1. Prospec, LLD, Distributed byProspec, Steve Sicliano1-888-773-2845 ext 1.
2. Substitutions: Section 01 2500 Substitution Procedures.

B. Floor Tile Ceramic Mosaic: ANSI A137.1, standard grade.

1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: 12 by 24 inch (300 by 600 mm), nominal.
3. Thickness: 3/8/"
4. Edges: Square.
5. Surface Finish: Matte glazed, Non-slip, to comply with or exceed DC of 0.42.
6. Color(s): As indicated on drawings.
   Pattern: As indicated on drawings
7. Products:

a. Prospec, Pro Linear Series.

C. Glazed Wall Tile: ANSI A137.1, standard grade and as follows:
1. Size: 4 x 12 inches.
2. Edges: Cushioned.
3. Surface Finish: Matte and Gloss as indicated on finish schedule.
4. Color(s): As selected by Fuller and D'Angelo P.C. from manufacturer's standard range.
5. Products:
a. Prospec, Pro Linear Series..
6. Substitutions: Section 01 2500 Substitution Procedures.

2.2 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: PVC and Stainless Steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Applications: Refer to Finish Schedule for types and finish.
a. Wall corners, outside and inside, open edges of wall tile.
a) Product: RONDEC-AC stainless steel.
b. Floor to wall transition: PHK D LX-PHK cove transition.
2. Manufacturers:
a. Schluter-Systems: www.schluter.com/#sle.
b. Substitutions: Section 01 2500 Substitution Procedures.

B. Thresholds: Marble, color as selected by the architect., honed finish; wide by full width of wall or frame opening; Cope ends of the saddle to match the profile of the door frame. Saddle shall be 1/2 inch thick (12.7 mm thick); beveled one long edge with radiused corners on top side; without holes, cracks, or open seams. Profile shall be ADA compliant.
1. Applications:
a. At doorways where tile terminates.
b. At open edges of floor tile where adjacent finish is a different height.
c. Where indicated on the drawings.

2.3 ADHESIVE MATERIALS

A. Manufacturers:
1. Mapei Corporation; Product KERABOND/KERALASTIC SYSTEM: www.mapei.com.
2. Substitutions: Section 01 2500 Substitution Procedures.

B. Latex-Portland Cement Mortar (Thinset Installation Methods): ANSI A118.4, composed as follows:
1. Universal two component setting system consisting of liquid synthetic polymer additive and dry set mortar.
a. For wall applications, provide nonsagging, latex-Portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

2.4 WATERPROOFING/CRACK ISOLATION FOR THIN-SET TILE INSTALLATIONS

A. Acrylic based, roller applied waterproofing/crack isolation system
1. Mapelastic HPG; Mapei Corporation
2. Mapei Aqua Defense. For use over primer.

2.5 GROUTS

A. Manufacturers:
1. Mapei Corporation ; Product Mapei Opticolor.
a. Use for grout in toilets areas.
2. Substitutions: Section 01 2500 Substitution Procedures.

2.6 ACCESSORY MATERIALS

A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers

D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
   1. Products: MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout
      a. Provide sealer coat over all tile floors

E. Expansion Joints: Provide expansion joints for Unglazed Porcelain Tile on each column line and as recommended by the TCA Handbook for the installation reference EJ171-04 manufacturer.
   1. Schluter Dilex as manufactured by Schluter Systems.
      a. PVC anchor legs and side sections, with chlorinated polyethylene sealant

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
   1. Moisture Emission Rate: Not greater than 3 lb per 1000 sq ft (7.1 kg per 100 sq m) per 24 hours, test in accordance with ASTM F1869.
   2. Alkalinity (pH): Verify pH range of 5 to 9, test in accordance with ASTM F710.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive. Refer to TCNA (HB) EJ 171 for location and frequency of joints.

J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units install in accordance with TCNA (HB) Method W223, organic adhesive.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Placement of special anchors or inserts for suspension system.

C. Section 05 3100 - Steel Decking: Placement of special anchors or inserts for suspension system.

D. Section 05 4000 - Cold-Formed Metal Framing.

E. Section 07 4213 - Aluminum Soffit Panels.

F. Section 07 9200 - Joint Sealants: Acoustical sealant.

G. Section 09 8430 - Sound-Absorbing Wall and Ceiling Units for acoustical ceiling units.

H. Divisions 22, 23, and 26 for fire alarm, air outlets and inlets, and light fixtures

1.4 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.

D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

F. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.

G. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

H. Ceilings and Interior Systems Construction Association (CISCA): Code of Practices.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components.

C. Samples: Submit two samples 12 x 12 inch (300 by 300 mm) in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 12 inches (300 mm) long, of suspension system main runner.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.

1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.6 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.

B. Fire Performance: ASTM E84 surface burning characteristics. Flame Spread index 25 or less. Smoke development index 50 or less. (UL Labeled) Class A in accordance to ASTM E1264

C. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

E. Installers Qualifications: Company specializing in the installation of acoustical ceilings specified in this section with minimum 5 years documented experience.

F. Pre-installation Conference: Conduct conference at Project site minimum one week before installation. Agenda shall include project conditions, coordination with work of other trades, and layout of items which penetrate ceilings.

1.7 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements.

B. Deliver extra acoustical units for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.

1. Tile: Furnish 5 percent of total acoustic unit area of extra tile to Owner.
2. Panels: Furnish 5 percent of total acoustic unit area of extra panels to Owner.
3. Suspension System Components: Furnish 5 percent of each exposed component of the quantity installed

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect system components from excessive moisture in shipment, storage, and handling

A. Warranty: Provide manufacturer's standard warranty against manufacturing defects in material or workmanship when installed in accordance with the current CISCA Handbook and ASTM C367:

1. Armstrong Warranty Period: 30 years.

1.9 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:

1. Armstrong World Industries, Inc: www.armstrong.com.
2. Substitutions: See Section 01 2500 - Substitution Procedures.

B. Suspension Systems:

1. Armstrong World Industries, Inc; Prelude XL: www.armstrong.com.
2. Substitutions: See Section 01 2500 - Substitution Procedures.

2.2 ACOUSTICAL UNITS

A. Armstrong World Industries, Inc: www.armstrong.com.

B. Acoustical Tile Type ACT-1: Painted mineral fiber, ASTM E1264 Type III, Form: 1, Pattern EIC with the following characteristics:
   1. Size: 24 by 24 inches (600 by 600 mm).
   2. Thickness: 7/8 inches (2.1875 mm).
   3. Light Reflectance: 85 percent, determined in accordance with ASTM E1264.
   4. NRC Range: 0.75 determined in accordance with ASTM E1264.
   5. Articulation Class (AC): 170, determined in accordance with ASTM E1264.
   6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   7. Sag/Humidity Resistance: Humiguard
   8. Fire Performance: Class A UL)
   9. Edge: Beveled tegular.
   10. Surface Color: White.
   11. Suspension System: Exposed grid Type Prelude XL.
   12. Products:
      a. Cirrus High NRC 565.
      b. Substitutions: See Section 01 2500 - Substitution Procedures.

C. Acoustical Tile Type ACT-2: Painted mineral fiber, ASTM E1264 Type III, Form: 1, Pattern EIC with the following characteristics:
   1. Size: 24 by 48 inches (600 by 1200 mm).
   2. Thickness: 7/8 inches (2.1875 mm).
   3. Light Reflectance: 85 percent, determined in accordance with ASTM E1264.
   4. NRC Range: 0.75 determined in accordance with ASTM E1264.
   5. Articulation Class (AC): 170, determined in accordance with ASTM E1264.
   6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   7. Sag/Humidity Resistance: HumiGuard
   8. Fire Performance: Class A UL
   9. Edge: Beveled tegular.
   10. Surface Color: White.
   11. Suspension System: Exposed grid Type Prelude XL.
   12. Products:
      a. Cirrus High NRC 563.
      b. Substitutions: See Section 01 2500 - Substitution Procedures.

D. Linear Blade Type ACT 3: Polycarbonate linear panels.:
   1. Length: 4', 6 & 8'.
   2. Weight: 1.63 lbs./lf.
   3. Finish: Smooth.
   4. Suspension: End to end Connectors: .Black. Suspend panels in alternating pattern.
   5. Class A equivalent when tested according to NFPA 286.
   6. Spacing Between Blades: Minimum as indicated on the reflected ceiling plan.
   7. Surface Color: As shown on drawings.
   8. Products:
      a. Armstrong World Industries,"Infusions® Blades – Concepts".
      b. Substitutions: See Section 01 2500 - Substitution Procedures.

E. Acoustical Tile Type ACT 4: Vinyl face membrane faced mineral fiber Type: IV, Form: 2, Pattern: E with the following characteristics:
   1. Size: 24 by 48 inches (600 by 1200 mm).
   2. Thickness: 5/8 inches (15.9 mm).
   3. Texture: Smooth.
   4. Clean Room Classification 100
   5. Light Reflectance: 80 percent, determined in accordance with ASTM E1264.
   6. Sag/Humidity Resistance: HumiGuard Plus.
   7. Fire Performance: Class A UL
   8. Insulation Value: R Factor-BTU: 1.5 BTU.
   9. Mold And Mildew Resistant: BioBlock.
   10. Water Repellent.
   11. Soil Resistance.
   12. Wash and scrubable.
   13. Edge: Square.
   14. Surface Color: White.
   15. Suspension System: Exposed grid Type Prelude XL.
   16. Products:
      a. Clean Room VL 870.

F. Acoustical Tile Type ACT-5 Lay-in Ceiling Panels Metal:
   1. Size: 24 by 48 inches (600 by 1200 mm).
   2. Surface Texture: Smooth.
   3. Thickness: 1-1/2 inches.
   4. Panel Edge: Square.
   5. Color: As indicated on drawings.
   6. Suspension System: Exposed grid Type 15/16" Torsion Spring, 60 psf Designed Wind Uplift..
   7. Products:
      a. Acoustic Ceiling Products; Armstrong MetalWorks, Torsion Spring Exterior 7226 M1: www.acpideas.com/#sle.

G. ACT Type 6: Aluminum Flush Panels Full Vented
   1. Refer to Section 07 4213 - Aluminum Soffit Panels for specifications

H. ACT Type 7: Sound Absorbing Units
   1. Refer to Section 09 8430 - Sound-Absorbing Wall and Ceiling Units for specifications

I. ACT Type 8: Thermo Plastic Sound Diffusing Units
   1. Refer to Section 09 8430 - Sound-Absorbing Wall and Ceiling Units for specifications

2.3 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Armstrong World Industries, Inc; Product Prelude XL 15/16": www.armstrong.com.
   2. Structural Classification: Intermediate duty, ASTM C 635.

B. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty.
   1. Profile: Tee; 15/16 inch (24 mm) wide face.
   2. Construction: Double web.
   3. Finish: White painted.
   4. Use for all ACT ,unless noted otherwise.

D. Exposed Aluminum Suspension System: Extruded aluminum; heavy-duty.
   1. Profile: Tee; 15/16 inch (24 mm) wide face.
   2. Finish: Painted white.
   3. Use for ACT-5.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. Minimum 7/8" horizontal flange
   2. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

D. Hold-Down Clips: Provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees for all ACT-5 ceilings.
   1. Material: Steel.
   2. Manufacturer: Two Part Clip # 495.00 Rockfon Faucett .

E. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9200 - Joint Sealants.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Install in bed of acoustical sealant.
   2. Use longest practical lengths.
   3. Overlap and rivet corners.

3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:

1. Make field cut edges of same profile as factory edges.

G. Install plastic lay-in panels at following minimum distance from conventional light sources:

H. Install seismic clips or stabilizer bars as per code requirements.

3.4 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 ADJUSTING AND CLEANING

A. Replace damaged or broken material, Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with mfg,, touch up procedures using touch up paint as required for small nicks and minor scratches in the surface, Remove and replace any work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

1. Provide touch up kit for Owner's use.

END OF SECTION

WOOD STRIP AND PLANK FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Wood strip flooring, nailed.

B. Secondary subflooring.

C. Resilient Pads.

D. Vented cove base.

E. Sheet vapor retarder.

F. Surface finishing and game markings.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete subfloor surface, recesses, and formed depressions for deep floor sockets.

C. Section 08 7100 - Door Hardware for thresholds.

D. Section 11 6623 - Gymnasium Equipment

1.4 REFERENCE S TANDARDS

A. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

B. MFMA (PUR) - Performance and Uniformity Rating Sport Specific Standards; current edition.

C. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; current edition.

D. NWFA (IG) - Installation Guidelines; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for flooring.

C. Shop Drawings: Indicate floor joint pattern and termination details.
   1. Indicate provisions for expansion and contraction, base, and game insert or socket devices.
   2. Indicate location, size, design, and color of game markings.
   3. Indicate size and type fasteners and anchors.

D. Samples: Submit two samples 24 by 24 inch (600 by 600 mm) in size illustrating floor finish, color, and sheen.

E. Sustainable Design Submittal: Submit VOC content documentation for field-applied adhesives, stains, finish coatings, and sealers.

F. Certificates attesting that materials furnished will meet specifications for grade, quality, dryness and treatment, if required

G. Installation Instructions: Indicate standard and special installation procedures.

H. Maintenance Data: Include maintenance procedures and recommended maintenance materials.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with MFMA (SPEC).

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.

C. Installer Qualifications: Company specializing in performing work of this section with minimum five years experience **and approved by manufacturer.**
   1. Minimum five (5) years of documented experience and a minimum of three (3) completed projects of similar magnitude and complexity.
   2. MFMA accredited and approved by flooring manufacturer.

D. Surface Appearance
   1. Expansion spaces will not exceed 1/64" (0.4mm) at time of installation and will be spread evenly across the floor with each row of flooring.

E. Expansion spacing will be installed to allow for normal expected increases in Equilibrium Wood Moisture Content (EMC)

1.7 MOCK-UP

A. Construct mock-up of wood athletic flooring including subflooring, resilient cushioning, and wood flooring. Illustrate final finish and include example of painted game lines.

B. Size of mock-up to be not less than 120 inch (3000 mm) long by 120 inch (3000 mm) wide.

C. See Section 01 4000 - Quality Requirements for additional requirements.

D. Locate where directed.

E. Mock-up may remain as part of the work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials
   1. Materials shall not be delivered, stored or installed until all masonry, painting, plastering tilework, marble and terrazzo work is complete, and all overhead mechanical work, lighting, backstops, scoreboards are installed. Room temperature of 55-80 degrees Fahrenheit (13 to 27 degrees Celsius) and relative humidity of 35-50 % are to be maintained. Ideal installation/storage conditions are the same as those that will prevail when building is occupied.
   2. Materials shall not be stored at the installation location if the moisture content of the concrete slab exceeds 4% or vapor transmission exceeds 4.5 pounds per 1,000 square feet (2.20 kg per 100 square meters)

1.9 FIELD CONDITIONS

A. Provide heat, light, and ventilation prior to installation.

B. Store materials in area of installation for minimum period of 24 hours prior to installation.

C. Maintain room temperature between 55 degrees F (13 degrees C) and 75 degrees F (24 degrees C) and relative humidity between 35 to 50 percent for a period of seven days prior to delivery of materials to installation space, during installation, and after installation.

D. Acclimate wood flooring materials to installation space a minimum of 48 hours prior to installation.

E. After floors are finished, area to be kept locked by general contractor to allow curing time for the finish. If after required curing time general contractor or owner requires use of gym, he shall protect the floor by covering with non-fibered kraft paper or red rosin paper with taped joints, until acceptance by owner (or owner's agent) of complete gymnasium floor.

1.10 JOB CONDITIONS-SEQUENCY

A. Do not install floor system until concrete has been **cured 60 days** and the requirements in paragraph are 1.8 obtained.

B. Contractor is responsible to ensure slab is clean and free of all dirt and debris prior to floor installation beginning.

C. Permanent heat, light and ventilation shall be installed and operating during and after installation. Maintain a temperature range of 55 to 80 degrees Fahrenheit (13 to 27 degrees Celsius) and a relative humidity range of 35 to 50%. Consult MFMA guidelines for further information.

D. After floors are finished, area to be kept locked by general contractor to allow curing time for the finish. If after required curing time general contractor or owner requires use of gym, he shall protect the floor by covering with non-fibered kraft paper or red rosin paper with taped joints, until acceptance by owner (or owner's agent) of complete gymnasium floor.

1.11

1.12 GUARANTEE

A. Guarantee shall not cover damage caused in whole or in part by casualty, ordinary wear and tear, abuse, use for which material is not designed, faulty construction of the building, settlement of the building walls, failure of the other contractors to adhere to specifications, separation of the concrete slab and excessive dryness or excessive moisture from humidity, spillage, migration through the slab or wall, or any other source.

B. Manufacturer and installer warrants the flooring system material to be free from manufacturing defects for a period of 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hardwood Strip and Plank Flooring:
   1. Robbins Sports Floor; Product: Bio Cushion Classic.

B. Wood Floor Finish:
   1. Advantage Coating Technologies, Defense www.advantagecoatingstech.com.

C. Substitutions: See Section 01 2500 - Substitution Procedures

2.2 MATERIALS

A. General: Wood strip flooring, MFMA (PUR) compliant for application indicated; system components provided by single manufacturer.

B. Wood Strip Flooring:
   1. Species: Unfinished KD Northern Hard Maple, Continuous strip.
      a. Product: XL as manufactured by Robbins, graded in accordance with MFMA FJ rules.
   2. Grade: First.
   3. Cut: Edge grain.
   4. Moisture Content: 7 to 9 percent.
   5. Actual Thickness: 25/32 inch (20 mm).
   6. Actual Face Width: 2-1/4 inches (57 mm).
   7. Edge: Tongue and Groove.
   8. End: Square.
   9. Length: Random, minimum of 9 inches (230 mm).
   10. Technology to reduce or eliminate routine spacing for expansion. Robbins XLplus™ or equal.
   11. Slab Depression: 2-1/8 inches.

C. Fasteners:
   1. Flooring Nails: 2" (15) gauge cleats or staples.
   2. Subfloor: (Glued and Fastened) 1" length, 7/16" (11mm) crown, coated staples or equivalent. Verify length of fastener will be shallower than the depth of the top of the radiant heat tubing in the floor slab.
      a. Construction adhesive, PL400 or equivalent.

D. EPDM Pads: 7/16" Robbins Bio-pad.

E. Secondary Subflooring: 2 layers of 15/32" plywood, APA Rated Sheathing, span rating of 24" with square edges; Exposure 1, sanded.

F. Vapor Retarder: Black polyethylene sheet, 8 mil (0.2 mm) thick; 2 inch (50 mm) wide tape for joint sealing.

2.3 ACCESSORIES

A. Moisture Control System: Two-coat moisture control system that suppresses excessive moisture vapor emissions in existing concrete prior to the installation of finished flooring.

1. Product: Ardex MC, Moisture Control System, Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 1500, 888-512-7339, www.ardex.com.

B. Ventilating Base: Molded rubber, 4 inch (100 mm) high with a 3 inch (75 mm) toe, pre-molded outside corners; black color.

C. Transition Strip: Same species and finish as flooring material; profiles indicated.

D. Floor Finish: 2 Part Water borne urethane, to achieve high gloss surface; type recommended by flooring manufacturer. 1. Defense, sports floor finish and Sport Tone, sealer, as manufactured by Advantage Coating Technologies., to achieve high gloss surface.

E. Marking Paint: Urethane. Gameline paint(s) shall be recommended by the finishing materials manufacturer, and must be compatible with the finish.

F.

2.4 SOURCE QUALITY CONTROL

A. Inspect and stamp species and grade on underside of each piece of wood flooring at factory.

PART 3 EXECUTION

3.1 PRE-INSTALLATION TESTING

A. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.

B. Concrete to cure minimum 60 days.

C. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Moisture Testing: Moisture testing shall be performed using ASTM test method ASTM F 2170 in situ Relative Humidity Test. The acceptable test result when using test method F 2170 should not exceed eighty five per cent (85%) AND pH readings should not exceed 9.0.

3.2 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that concrete subfloor surface is steel troweled and smooth and flat to plus or minus 1/8 inch in 10 feet (3 mm in 3 m). Flat Flatness and Floor Levelness (FF and FL) numbers not recognized.

C. Inspect leveled concrete slab for proper tolerance and dryness, and report any discrepancies to the owner's representative and architect in writing. Verify slab is level to within 1/8" (3mm) in a 10' (3m). Test slab to verify moisture content of the concrete slab shall not exceed 85% using ASTM F 2170 In-Slab Relative Humidity test. Provide in 4 locations.

D. Broom clean subfloor.

E. Verify that required floor-mounted utilities are in correct location.

3.3 PREPARATION

A. Remove existing bituminous vapor barrier and mechanically abrade and profile existing floor slab. See asbestos abatement specification sections for requirements for existing vapor barrier removal.

B. Provide self-leveling concrete underlayment over entire existing slab surface to ensure compliance with flooring manufacturer's floor flatness tolerances. See specification section 03 5400.

C. Inspect leveled concrete slab for proper tolerance and dryness, and report any discrepancies to the owner's representative and architect in writing. Verify slab is level to within 1/8" (3mm) in a 10' (3m). Test slab to verify moisture content of the concrete slab shall not exceed 85% using ASTM F 2170 In-Slab Relative Humidity test. Provide in 4 locations.

D. Secondary Subflooring: Place plywood subflooring over sleepers. Place .

E. Prepare substrate to receive wood flooring in accordance with manufacturer's and NWFA instructions.

F. Broom clean substrate.

3.4 INSTALLATION

A. Vapor Barrier:
1. Install polyethylene with joints lapped a minimum of 6" (150mm) and turned up 4" (100mm) at the walls. Tape all joints.

B. Subfloor:
1. Install shock absorbing pads per manufacturer's recommendations.
2. Install the lower subfloor perpendicular to the intended finish flooring direction. All joints shall be staggered 4' and spaced ¼" (6mm) apart.
3. Install solid blocking at doorways, under bleachers in the stacked position, and below portable goals.
4. Install Bleacher Blocking per manufacturer's recommendations.
5. Install the upper subfloor diagonal to the lower subfloor panels staggering joints 4' and spacing ¼" (6mm) apart. Secure these panels using adhesive(Box X patteren) and 1" (25mm) staples placed 6" (150mm) On Center (O.C.) at panel perimeter and 12" (300mm) O.C. throughout interior.

C. Wood Flooring:
1. Install in accordance with manufacturer's and MFMA instructions; blind nail to subfloor.
2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.
3. Arrange flooring with end matched grain set flush and tight.
4. Machine nail maple finish flooring 10" to 12" (250mm to 300mm) O.C. with end joints properly driven up and proper spacing provided for humidity conditions in specific regions. Provide 2" (50mm) expansion voids at the perimeter and at all vertical obstructions.
5. Install flooring under movable partitions without interrupting floor pattern.
6. Provide 2 inch (50 mm) expansion space at fixed walls and other interruptions.

D. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside and provide premolded outside corners.

E. Finishing:
1. Mask off adjacent surfaces before beginning sanding.
2. Sand flooring to smooth even finish with no evidence of sander marks as per manufacturer's recommendation. Take precautions to contain dust. Remove dust by vacuum.
3. Apply finish in accordance with floor finish manufacturer's and MFMA instructions.
4. After sanding, buff entire floor using 100 grit screen or equal grit sandpaper, with a heavy-duty buffing machine.
5. Inspect entire area of floor to insure the floor presents a smooth surface without drum stop marks, gouges, streaks or shiners.
6. Vacuum and/or tack floor before first coat of seal. Floor should be clean and completely free of dirt and sanding dust
7. Apply sealer coat, 1st finish coat, game lines and 2 finish coats.

8. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat.
9. Lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
10. Apply colored game lines 2 inches (50 mm) wide and logo to layout indicated on drawings.
11. Apply game lines accurately after the buffing and vacuuming the coated surfaces. Layout in accordance with drawings. For game lines, use current rules of association having jurisdiction. Lines shall be straight with sharp edges in colors selected by architect.
12. Apply 2 additional coats of finish. over game lines sanding between coats in accordance with finish manufacturer's recommendations.

3.5 CLEANING

A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

3.6 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION

RESILIENT FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Moisture mitigation testing.

B. Resilient tile flooring.

C. Sheet vinyl flooring.

D. Resilient base.

E. Resilient stair accessories.

F. Installation accessories.

G. Resilient Athletic Flooring.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

C. Section 03 5400 - Cast Underlayment.

D. Section 09 6566 - Resilient Athletic Flooring

E. Section 12 3200 - Plastic Laminated Casework for rubber base requirements.

F. Section 12 3553 - Wood Laboratory Casework for rubber base requirements.

1.4 REFERENCE STANDARDS

A. ASTM D2047 - Static coefficient of friction.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E492 -Acoustical.

D. ASTM E662 - Smoke Density.

E. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2017.

F. ASTM F137 - Flexibility.

G. ASTM F410 WeatrLayer Thickness.

H. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

I. ASTM F925: Standard Test Method for Resistance to Chemicals of Resilient Flooring.

J. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2017.

K. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004, with Editorial Revision (2014).

L. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2014).

M. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.

N. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.

O. ASTM F1869 - Test Method for Measuring Moisture Vapor Emissions in Concrete.

P. ASTM F1914 - Residual Indentation.

Q. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015, with Editorial Revision (2016).

R. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs.

S. ASTM F2420 - Standard Test Method for Determining Relative Humidity on the Surface of Concrete

T. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

U. EN 1815 - Electrostatic Propensity.

V. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

W. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.5 QUALITY ASSURANCE

A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience with resilient flooring of types equivalent to those specified. Manufacturers proposed for use, which are not named in this section, shall submit evidence of ability to meet performance requirements specified as per Section 01 2500 - Substitution Procedures.

1. Color Matching: Provide resilient flooring products, including wall base and accessories, from one manufacturer to ensure color matching.
2. Manufacturer capable of providing technical training and field service representation.

B. Installer Qualifications: Installer shall be recognized and approved by the manufacturer for the requirements of the project or INSTALL (International Standards & Training Alliance) resilient certified for the requirements of the project.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Verification Samples: Submit two samples, 12" x 12" in size illustrating color and pattern for each resilient flooring product specified.

D. Concrete Testing Standard: Submit a copy of ASTM F710.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. MSDS (Material Safety Data Sheets) should be submitted for all adhesives used:

1. Membrane, primer, patch, leveler, heat weld rod, cold weld, liquid wax and cleaning agents

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum ten (10) years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum five (5) years documented experienceand approved by flooring manufacturer.

C. Expansion spacing will be installed to allow for normal expected increases in Equilibrium Wood Moisture Content (EMC)

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store all materials off of the floor in an acclimatized, weather-tight space.

B. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions

C. Deliver materials sufficiently in advance of installation to condition materials to the required temperature prior to installation

D. Store sheet goods upright on a clean, dry, flat surface protected from all possible damage and from exposure to harmful weather conditions. Store tiles on a clean, dry, flat surface, carefully protecting corners and edges from all possible damage and from exposure to harmful weather conditions.

E. Protect roll materials from damage by storing on end.

F. Do not double stack pallets.

1.9 MOCK UP

A. Size of mock-up to be not less than 60 inch (1500 mm) long by 60 inch (1500 mm) wide.

B. See Section 01 4000 - Quality Requirements for additional requirements.

C. Locate where directed.

D. Mock-up may remain as part of the work.

1.10 MAINTENANCE

A. Extra Materials: Furnish one box of tile for each fifty boxes or fraction thereof, for each type, color, pattern and size of the tile installed, from same manufactured lot as materials installed.

1. Deliver extra tile to Owner after completion of work.
2. Furnish tiles in protective packaging with identifying labels.

1.11 FIELD CONDITIONS

A. Maintain minimum room temperature of 65 degrees F (18 degrees C) for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

B. Acclimate wood flooring materials to installation space a minimum of 48 hours prior to installation.

C. Store materials for not less than 48 hours before, during, and 72 hours after installation, in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

D. Store sheet goods upright on a clean, dry, flat surface protected from all possible damage and from exposure to harmful weather conditions. Store tiles on a clean, dry, flat surface, carefully protecting corners and edges from all possible damage and from exposure to harmful weather conditions.

1.12 PRE-INSTALLATION TESTING

A. Conduct pre-installation testing as follows:

1. ASTM F-1869 Test Method for Measuring Moisture Vapor Emissions in Concrete Maximum: 3 lbs/1000 SF
2. ASTM F-2170 Test Method for Determining Relative Humidity in Concrete: Maximum RH: 55%.

1.13 WARRANTY

A. Guarantee shall not cover damage caused in whole or in part by casualty, ordinary wear and tear, abuse, use for which material is not designed, faulty construction of the building, settlement of the building walls, failure of the other contractors to adhere to specifications, separation of the concrete slab and excessive dryness or excessive moisture from humidity, spillage, migration through the slab or wall, or any other source.

B. Provide manufacturer's non-prorated ten (10) year limited warranty to be free from defects in material and workmanship, under normal use and service, to repair or replace all defective tiles including reasonable labor.

PART 2 PRODUCTS

2.1 SHEET FLOORING

A. Vinyl Sheet Flooring - Type VCS-1: With foam underlayer. Color and pattern throughout wear layer thickness, with backing.
   1. Manufacturer:
      a. Johnsonite, Optima Acoustiflor (Acositc floor sheet).
      b. Substitutions: Sec Section 01 2500 - Substitution Procedures
   2. Minimum Requirements: Comply with ASTM F1303, Type II, with Class A fibrous backing.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253. Class 1.
   4. ASTM E 662/NFPA 258 (Smoke Density), less than 450
   5. VOC Content Limits: As specified in Section 01 6116.
   6. Flexibility (ASTM F 137): Passes
   7. Chemical Resistance (ASTM F 925): Passes.
   8. Wear Layer Thickness:.056 inch (1.4 mm) minimum.
   9. Total Thickness: 0.146 inch (3.65 mm) minimum.
   10. Residual Indentation (ASTM F 1914): Passes
   11. Sheet Width: 78 inch (1950 mm) minimum.
   12. Static Load Resistance: 125 psi (860 kPa) minimum, when tested as specified in ASTM F970.
   13. Static coefficient of friction (ASTM D 2047): > 0.6
   14. Seams: Heat welded.
   15. Integral coved base with cap strip.
   16. Acoustical (ASTM E 492): Impact Insulation Class of 61 IIC
   17. Color: As indicated on drawings.
   18. Warranty: Provide manufacturer's standard five (5) year warranty.

B. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.2 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Manufacturers:
      a. As indicated on finish schedule drawing.
      b. VCT #1 & 2 TOLI International, a Division of CBC (AMERICA) Corp, Telephone: 800.446.5476;: 800.446.5476; Fax: 631.864.8151; E-mail; Product Kolurpath.
      c. VCT #3 & 4 Johnsonite Tarket Group; Product Contina Grande.
      d. Substitutions: Sec Section 01 2500 - Substitution Procedures
   2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   4. Size: 18" x 18" for VCT #1 & 2; and 16" x 16" for VCT # 3 & 4.
   5. VOC Content Limits: As specified in Section 01 6116.
   6. Thickness: 0.125 inch (3.2 mm).
   7. Pattern: As indicated on drawings.
   8. Adhesives: As recommended by the manufacturer.
   9. Color: As indicated on drawings.

2.3 STAIR COVERING

A. Stair Treads with Integral Risers: Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com.
      b. Substitutions: Sec Section 01 2500 - Substitution Procedures
   2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   4. Nominal Thickness: 0.1875 inch (4.75 mm).
   5. Nosing: Round.
   6. Tread Texture: Raised.
   7. Color: As indicated on drawings.

B. Metal Repair Stair Angle: 0.75" x 1.75".
   1. Screw holes 2.5" oc.
   2. Length: As required for each stair.
   3. Location: Existing terrazzo stairs. Note: Existing treads to be provide with cementitious underlayment and stair tread and integral riser.
   4. Product: Nora # 6637.

2.4 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and Style A straight for carpet installation as follows:
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com.
      b. Substitutions: Sec Section 01 2500 - Substitution Procedures
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   3. Height: 4 inch (100 mm).
   4. Thickness: 0.125 inch (3.2 mm).
   5. Finish: Satin.
   6. Length: 4 foot (1.2 m) sections.
   7. Color: As indicated on drawings.

2.5 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated

C. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
   1. VOC Content Limits: As specified in Section 01 6116.

D. Vinyl Tile Adhesives: Latex adhesive, non-flammable, moisture and alkali resistant bond.
   1. Adhesive shall be as recommended by the manufacturer, compatible with tile and substrate.

E. Moisture Control System: One-coat moisture control system that suppresses excessive moisture vapor emissions in existing concrete prior to the installation of finished flooring.
   1. Product: Ardex MC Rapid, Moisture Control System, Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 1500, 888-512-7339, www.ardex.com.

F. Filler for Coved Base: Plastic.

G. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.

1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Moisture Testing: Moisture testing shall be performed using ASTM test method ASTM F 2170 in situ Relative Humidity Test. The acceptable test result when using test method F 2170 should not exceed seventy five per cent (75%) AND pH readings should not exceed 9.0.

E. Verify that existing concrete sub floor do not containing curing compound by placing 1/4 cup of water on surface. If water beads up scarify surface.

F. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Remove existing carpet, resilient flooring and flooring adhesives; follow the recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings.

B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

C. Concrete substrate that fully conforms to the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring is required, or as detailed in the manufacturer's Installation Guide.

D. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface up to 1/2".

E. Remove dexterous coatings from subfloor substrates that would prevent a positive adhesive bond, such as curing compounds incompatible with adhesive, paints, oils, adhesives, wax and sealers.

F. Completely remove existing solvent base adhesives to prevent bleeding and staining

G. **Mechanically profile with grinder 100% of all existing substrates receiving resilient flooring. Provide dust control as required.**

1. After profiling test substrate by place drop of water, or other means to insure all coatings, sealers etc have been removed. Repeat profiling if necessary**.**

H. Provide leveling compound over 100% of all existing substrates receiving resilient flooring

I. Prohibit traffic until filler is fully cured.

J. Clean substrate.

3.3 INSTALLATION GENERAL

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Do not install resilient flooring over building expansion joints.

D. Do not install defective or damaged resilient flooring.

E. Layout resilient flooring to provide equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.

F. Lay resilient flooring with arrows in the same direction (excluding borders).

G. Install resilient flooring without voids at seams. Lay seams together without stress.

H. Spread only enough adhesive to permit installation of materials before initial set.

I. Fit joints and butt seams tightly.

J. Set flooring in place, press with heavy roller to attain full adhesion.

K. Roll joints with minimum 50# roller.

L. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

M. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

N. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

O. Remove excess adhesive immediately

3.4 INSTALLATION SHEET FLOORING

A. Install resilient sheet goods in accordance with Manufacturer's current printed Installation Manual.

B. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.

C. Cut sheet at seams in accordance with manufacturer's instructions.

D. Seal seams by heat welding where indicated.

E. Finish seams in sheet rubber by heat welding.

1. Rout seams and weld together with coordinated colored heat welding rod or with coordinated colored cold weld compound in accordance with the manufacturer's instruction.

F. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

1. Extend flooring up the wall using the boot flash coning method, to a height as required. Provide cove stick and suitable capping strip. All internal and external vertical seams, or as specified shall be cold welded with coordinated colored cold weld. Do not heat weld the vertical seams

3.5 INSTALLATION TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.

D. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles

1. Lay tiles with grain running in one direction for multicolor tiles.
2. Lay tiles in pattern of colors and sizes indicated on Drawings.

3.6 INSTALLATION RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.7 INSTALLATION - STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Adhere over entire surface. Fit accurately and securely.

3.8 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

C. Cleaning of Vinyl Composition Tile

1. Sweep or dust mop to remove dirt and grit. Do not use treated dust mops.
2. Add heavy duty cleaner to cool water following the manufacturer's instructions.
3. Scrub with a 175-rpm machine or auto scrubber. Use a blue or green pad. Always wet the pad before use. Do not use a black or a build-up removal pad.
4. Remove the solution with a wet-dry vacuum or auto scrubber until floor is dry and free of residue.
5. Rinse the floor with clean water. Repeat the rinse process as necessary to remove all haze and residue.
6. Apply three to five coats of high gloss or matte floor finish following the manufacturer's instructions.
7. Owner shall wax all VCT flooring

D. Cleaning of Vinyl Sheet Flooring

1. 72 hours after installation is completed, initial maintenance procedures must be implemented in accordance with manufacturer's requirements
2.

3.9 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation and 72 hours heavy rolling loads.

3.10 SCHEDULE

A. Refer to Finish Schedule on drawings

END OF SECTION

RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Interlocking, loose-laid rubber tile.

B. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 01 2300 - Alternates: Resilient Athletic Flooring is contingent on the Owner's acceptance of Alternate GC-5.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

C. Section 09 6500 - Resilient Flooring.

1.4 REFERENCE STANDARDS

A. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2018.

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

C. ASTM F2772 - Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems; 2011.

D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

E. SCS (CPD) - SCS Certified Products; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.

1.6 PRODUCT PERFORMANCE AND TECHNICAL DATA

A. Hardness: ASTM D 2240 - 65 Shore A.

B. Slip Resistance: ASTM D-2047 - Exceeds Federal Standards and A.D.A. requirements for slip-resistant.

C. Static Load Limit: ASTM F 970 - Passes at 250 PSI.

D. Abrasion: ASTM D-3389 < 1.00 gram weight loss.

E. Flammability: ASTM D-2859 Pill Test - Passes with greater than 1" of un-charred area.

F. Chemical Resistance: ASTM F-925 – 5% Acetic Acid, 70% Isopropyl Alcohol, 5% Sodium Hydroxide, 5% Hydrochloric Isopropyl Alcohol, 5% Sodium Hydroxide, 5% Hydrochloric Acid, 5% Ammonia, Bleach, 5% Phenol, and Sulfuric Acid.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least five (5) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

PART 2 PRODUCTS

2.1 PREFORMED ATHLETIC FLOORING

A. Rubber Tile Flooring: Recycled rubber tires and colored EPDM granules with urethane binder, formed into interlocking tiles, and free-laid without adhesive.
   1. VOC Content: As specified in Section 01 6116.
   2. Thickness: Minimum 1/2 inch (12.7 mm).
   3. Size: Nominal 24 inch (600 mm) square.
   4. Tensile Strength: Minimum 150 psi (1.0 MPa), per ASTM D412.
   5. Surface Texture: Smooth.
   6. Color: COMI RA1 Mellowed, TB5 Sunspot.
   7. Products:
      a. "Replay" as manufactured by Johnsonite, Inc., Chagrin Falls, Ohio 44023, Email: info@johnsonite.com (800) 899-8916 .
      b. Substitutions: See Section 01 2500 Substitution Procedures .

2.2 ACCESSORIES

A. Concrete Underlayment:
   1. Structural Lightweight Concrete:
      a. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch (20.7 MPa).
      b. Water-Cement Ratio: Maximum 45 percent by weight.
      c. Maximum Slump: 4 inches (100 mm).
      d. Maximum Aggregate Size: 3/4 inch (19 mm).
      e. Maximum dry unit weight: 115 lb per cubic foot (1840 kg per cubic meter).
   2. Proportioning Normal and Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
      a. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
      b. Cement Binder: ASTM C 150, portland cement.
      c. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

B. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.

PART 3 EXECUTION

3.1 REMOVALS

A. Remove existing wood flooring, attachments and accessories as required to provide clean accessible surface to accept new concrete underlayment.

3.2 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
   1. Test in accordance with ASTM F710.
   2. Owner will retain and conduct tests by an independent testing agency.
   3. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Flooring must be site conditioned at room temperature for 48 hours prior to, during, and after installation. Room temperature must be maintained between 65? and 85?F (18? and 30?C) with HVAC system operating. A minimum temperature of 55degrees F (13C) must be maintained afterwards. The ambient relative humidity should be between 40% and 60%.

3.3 PREPARATION

A. Prepare floor substrates as recommended by flooring manufacturer.

B. Concrete Underlayment: Achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius (1/1000).

C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.4 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions and approved shop drawings.

C. Rubber Tile Flooring:
   1. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.
   2. Install loose-laid tile using interlocking pins to secure tiles to each other.

3.5 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.6 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION

EPOXY RESIN FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Decorative monolithic epoxy-resin flooring.
   2. Integral cove base.

1.3 SUBMITTALS

A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each resinous flooring system indicated.

C. Samples for Verification: Of each resinous flooring system required, 6 inches (150 mm) square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Material Certificates: Signed by manufacturers certifying that materials furnished comply with requirements.

F. Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 1.

1.4 PROPERTIES

Test	Specification	Requirement
Compressive Strength	ASTM-C579	12,000 p.s.i.
Tensile Strength	ASTM-C307 .	2,500 p.s.i.
Water Absorption	ASTM-C413	0.37% (NIL)
Thermal Coefficient of Expansion	ASTM-C531.	1.9x10 (-5) in./in. Deg F
Flexural Modules of Elasticity	ASTM-C580)	7.03 x 10 (6)
Resistance to Impact (concrete)	MIL -D3134 Maximum	10 Mils
Surface Hardness	ASTM D2240 Shore D	70 avg.
Indentation Characteristics	MIL-PRF-3134,	Not more than 5%
Flexural Modulus of Elasticity	ASTM C-580	7.03 x 10(6)
Resistance to Elevated Temperatures	MIL-D-3134J	No slip or flow
Impact Resistance	MIL-D-3134J	Withstands 16 ft lbs cracking/delamination/chipping
Water Absorption	ASTM C-413	0.37NIL
Thermal Coefficient of Expansion	ASTM C-531 1	.9x10 (-5) in./in. Deg F
Antimicrobial Resistance	ASTM G21	Passes
Thermal Shock 5 cycles	ASTM C-884	No cracking, crazing, warping, scaling or flaking

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable and is certified, in writing, to resinous flooring manufacturer.
   1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to install resinous flooring systems specified.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Field Samples: On floor area selected by Architect, provide full-thickness resinous flooring system samples that are at least 48 inches square to demonstrate texture, color, thickness, chemical resistance, cleanability, and other features of each resinous flooring system required. Simulate finished lighting conditions for review of in-place field samples.
   1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.
   2. After field samples are approved, these surfaces will be used to evaluate resinous flooring.
   3. Obtain Architect's approval of field samples before applying resinous flooring.
   4. Final approval of colors will be from field samples, not samples submitted for verification.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.

B. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Resinous Flooring Schedule at the end of Part 3.

2.2 MATERIALS

A. Resinous Flooring: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s). Comply with requirements indicated in the Resinous Flooring Schedule.
   1. Reinforcing Membrane: Manufacturer's flexible resin recommended for crack isolation to help prevent substrate cracks from reflecting through resinous flooring.
      a. Provide fiberglass scrim embedded in reinforcing membrane.

B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

D. Waterproofing Membrane: Type recommended or produced by manufacturer of epoxy resin composition flooring system for type of service and floor condition indicated.

E. Anti Microbial Additive: Incorporate antimicrobial chemical additive to control growth of most algae, bacteria, fungi, mildew and mold.

F. Moisture Mitigation System: Concrete, especially slab on grade should be tested in accordance with ASTM F1869. If pounds exceed flooring limit remedial action must be taken.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where decorative quartz epoxy flooring is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect

3.2 PREPARATION

A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.

B. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

D. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.3 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum undercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

B. Apply epoxy primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply reinforcing membrane to substrate cracks.

D. Apply self-leveling epoxy slurry body coat(s) in thickness indicated.

E. Broadcast Coats: Apply liberal application of clear epoxy resin mixture, allow to self level, broadcast (by hand or spray machine) ceramic coated quartz aggregate, allow to set to hardness, sweep off excess unbonded aggregate and repeat process to achieve total nominal thickness of 1/16" 1/8".

F. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.

G. Finish or Sealing Coats: After quartz filled broadcast coats have cured sufficiently, apply finish coats of type recommended by flooring manufacturer to produce a slip resistant finish matching approved submittal sample and in number of coats and spreading rates recommended by manufacturer.

1. Finished floor shall be 1/8" thick, uniform in color and free of trowel marks

3.4 FIELD QUALITY CONTROL

A. Material Sampling: Owner may at any time and any number of times during flooring application require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified and sealed, and certified in presence of Contractor.
2. If test results show installed materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.5 CURING, CLEANING AND PROTECTING

A. Cure decorative quartz epoxy flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.

B. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

C. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

3.6 RESINOUS FLOORING SCHEDULE

A. Epoxy Resinous Flooring : Provide resinous flooring system complying with the following:
1. Products: Provide the following, or approved equal:
   a. Sherwin Williams Ceramic Carpet #400
2. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for resinous flooring complying with requirements indicated.
3. System Thickness: 3/16 inch.
   a. Primer Coat.
   b. Two Broadcasts coats.
   c. Grout Coat
   d. Top Coat
4. Wearing Surface: Antislip
5. Base: 4-inch high integral cove base.
6. Color: Pre-Blended Standard Colors as indicated on Finish Schedule.
7. Components: Provide manufacturer's standard components complying with requirements, unless otherwise indicated. Provide the following additional components:
   a. Epoxy Primer.
   b. Reinforcing membrane if required over existing surface cracks.
   c. Body Coat.
   d. Chemical-resistant sealing or finish coat(s)
8. Substitutions: See Section 01 2500 - Substitution Procedures.

WALL COVERINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and prime painting.

B. Wall covering.

C. Projection Dry Erase Wallcovering.

D. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section: 09 2116 - Gypsum Board Assemblies

C. Section 09 9123 - Interior Painting: Preparation and priming of substrate surfaces.

1.3 REFERENCE STANDARDS

A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002 (Reapproved 2013).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. Shop Drawings: Indicate wall elevations with seaming layout.

D. Samples: Submit two samples of wall covering, 24 x 24 inch (600 x 600 mm) in size illustrating color, finish, and texture.

E. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Wall Covering Materials: 25 linear feet (8 linear m) of each color and pattern of wall covering; store where directed.
3. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five (5) years of documented experience.

1. Manufacturer: Provide each type of dry erase wallcovering required produced by one manufacturer

B.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.6 MOCK-UP

A. Provide panel, ___ panel drops wide, full height, illustrating installed wall covering and joint seaming technique.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver presentation wallcoverings to the project site in unbroken and undamaged original factory packaging and clearly labeled with the manufacturer's identification label, quality or grade, and lot number.

B. Inspect roll materials at arrival on site, to verify acceptability.

C. Protect packaged adhesive from temperature cycling and cold temperatures.

D. Store materials in a clean, dry storage area with temperature maintained above 55°F (13°C) with normal humidity.

E. Do not store roll goods on end.

1.8 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 55°F (13°C) unless required otherwise by manufacturer's instructions.

C. Apply adhesive when substrate surface temperature and ambient temperature is above 55°F (13°C) and relative humidity is below forty percent.

D. Maintain these conditions 72 hours before, during, and after installation of adhesive and wall covering.

E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surfaces.

1.9 MAINTENANCE

A. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

1.10 WARRANTY

A. Submit manufacturer's limited five-year written warranty against manufacturing defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Walltalkers matte•rite: Smooth low gloss vinyl surface for projection and dry erase markers.
   1. MP50: 49/50 inch (1.25/1.27m) width, non-woven backing, white only.

2.2 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
   2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.

B. Wall Covering - Type KR-60: 60 inch width, non-woven backing.:
   1. Laminated Thickness: 0.017. (0.43mm)
   2. Total Weight: 18 oz/sq. yd..
   3. Fabric Weight: 1.8 oz./sq. yd.
   4. Vinyl Weight: 12 oz./sq.yd..
   5. Roll Width: 60 inches (1520 mm).
   6. Backing: Non-woven, Polyester/Cellulose.
   7. Tensile Strength: 75 x 75. (lbs).

8. Elmendorfr Tear: 30 x 18 (Scale)
9. Color: White.
10. Surface Texture: Smooth.
11. Overcoating: Manufacturer's standard coating for stain resistance.
12. Manufacturers:
    a. Koroseal/RJF International: www.koroseal.com/#sle.
    b. Substitutions: See Section 01 2500 Substitution Procedures.

C. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

D. Substrate Primer and Sealer: Alkyd enamel type.

2.3 ACCESSORIES

A. Adhesives: Heavy-duty clear or clay based premixed vinyl adhesive.

B. Substrate Primer/Sealer: White pigmented acrylic base primer/sealer specifically formulated for use with vinyl wallcoverings.

C. Presentation Starter Kit: Provide one Walltalkers starter kit containing:
1. eight dry erase, markers, one eraser, two dry erase cleaning cloths, one empty bottle for water, and one 8 ounce (.23kg) bottle liquid surface cleaning solution for each room installed with dry erase wallcovering.
    a. RK1RSK2: Regular starter kit with standard dry erase markers.
    b. Provide in each room containing wall covering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and installation conditions to ensure surface conditions meet or exceed a Level 4 finish, per GA-214-M-97: Recommended Levels of Gypsum Board Finish, and permanent lighting should be installed and operational.

B. Verify substrate surface is clean, dry, smooth, structurally sound, and free from surface

C. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds exceed four percent level or recommended by wall covering. manufacturer.

E. Evaluate all painted surfaces for the possibility of pigment bleed-through.

F. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.

G. Beginning of installation means acceptance of surface conditions.

3.2 PREPARATION

A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.

B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces that affect work of this section.

E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

F. Vacuum clean surfaces free of loose particles.

3.3 INSTALLATION

A. Acclimate wallcovering in the area of installation a minimum of 24 hours before installation.

B. Read and follow the manufacturer's installation instruction sheet contained in each roll of the dry erase wallcovering.

C. Examine all materials for pattern, color, quantity and quality, as specified for the correct location prior to cutting.

D. Apply adhesive and wall covering in accordance with manufacturer's instructions.

E. Apply adhesive to wall surface immediately prior to application of wall covering.

F. Adhesive: Apply a uniform coat of heavy-duty pre-mixed clay-based or extra strength clear wallcovering. adhesive

G. Install each strip horizontally and in the same sequence as cut from the roll.

H. Install dry erase wallcovering sheets in exact order as they are cut from bolt. Reverse hang
   1. alternate strips (except lined products). Do not crease or bend the wallcovering when handling.

I. Using a level or straight edge, double cut the seam with a seam-cutting tool
   1. (Ex: Double Seam-Cutter or Swedish Knife). Do not score drywall or plasterboard
   2. when cutting material.

J. When covering the entire wall, seam the material out of the main writing and viewing areas of the wall.

K. Apply wallcovering to the substrate using a wallcovering smoother, wrapped with a soft cloth, to remove air bubbles. Do not use sharp edged smoothing tools. Smooth material on the wall from the middle to the outside edge.

L. Remove excess adhesive immediately after the wallcovering is applied. Clean entire surface with a warm mild soap solution, and clean soft cloths. Rinse thoroughly with water and let dry before using. Change water often to maintain water clarity.

M. Stop installation of material that is questionable in appearance and notify the manufacturer's representative for an inspection.

N. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

O. Butt edges tightly.

P. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.4 CLEANING

A. Upon completion of installation, remove all exposed adhesive immediately using a soft cloth and a warm, mild soap solution and rinse thoroughly with water and dry with clean towel prior to using.

B. Upon completion of the work, remove surplus materials, rubbish, and debris resulting from the wallcovering installation. Leave areas in neat, clean, and orderly condition.

C. Reinstall wall plates and accessories removed prior to work of this section.

3.5 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

PLASTIC LAMINATE WALL SURFACES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-manufactured panel system including mounting hardware and specified accessories.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   1. Class 1/A - Flame Spread 0-25, Smoke Developed 450 or less.
   2. Class 2/B - Flame Spread 26-75, Smoke Developed 450 or less.

B. Architectural Woodwork Institute (AWI) Quality Standards.

C. National Electrical Manufacturer’s Association (NEMA)

1.3 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's Safety Data Sheets (MSDS) on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with adjacent work.

D. Selection Samples: For each finish product specified, one complete set of color samples representing manufacturer's standard range of available colors and patterns.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Firm experienced in successful production of wall systems similar to that indicated for the Project, with sufficient production capacity to produce required units without causing delay in the work.
   2. Provide certificate signed by panel manufacturer certifying that products comply with specified requirements.

B. Installer Qualifications: Demonstrate successful experience in installing architectural woodwork similar in type and quality to those required for this project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver wall system until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate wall system have been completed in installation areas as specified by AWI 1700-G-3.

B. If panels are stored prior to installation, store them flat in completely enclosed areas, out of the weather. If panels must be stored in other than installation areas, store only in areas where environmental conditions comply with manufacturers recommendations. Do not expose panels to continuous direct sunlight, nor to extremes in temperature and humidity. Store products in manufacturer's packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Do not deliver or install wall system until building is enclosed, wet work is complete and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period as specified by AWI 1700-G-3.

B. Do not install wall system until normal lighting conditions exist. Normal lighting conditions are described as those in place when the project is finished. This includes, but not limited to, design lighting (wall washers, spot lights and flood lights, and similar fixtures) and natural lighting.

C. Wall, ceilings, floors, and openings must be level, plumb, straight, in-line and square as specified by AWI 1700-G-3.

D. 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. Panels shall be conditioned in the environment in which they will be installed for a minimum of 72 hours prior to installation. The recommended environment is 75 degrees F (24 degrees C) and 45 percent relative humidity.

E. Environmental Conditions: Comply with Woodwork Manufacturer's recommendations for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

1.7 WARRANTY

A. Manufacturer warrants any product it has manufactured and sold against defects in materials or workmanship for a period of five years from the date of original purchase and acceptance for use. This warranty extends to products assembled / installed and used in the manner intended and does not cover damage or failure caused by: misuse, abuse or accidents, exposure to extreme temperature, improper installation, improper maintenance and exposure to water or excessive humidity or excessive moisture.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Panel Specialists, Inc.; 3115 Range Rd., Temple, TX 76504. ASD. Toll Free Tel: (800) 947-9422. Tel: (254) 774-9800. Fax: (254) 774-7222. Email: psiwalls@panelspec.com. <mailto:psiwalls@panelspec.com> Web: <http://www.panelspec.com>

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

2.2 PANEL SYSTEMS

A. Provide prefinished decorative panels where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

B. Comply with applicable requirements of "Architectural Woodwork Quality Standards" in the production and installation of the wall panel system as published by the Architectural Woodwork Institute (AWl) unless otherwise indicated.

C. Panel System: #312-310 as manufactured by Panel Specialists, Inc. A progressive panel system with an exposed ½ inch (12mm) recessed horizontal channel reveal and a 1/16 inch (1.4mm) vertical divider molding creating a horizontal and vertical reveal between edge banded panels. Recommended for vertical and horizontal interior installations. Maximum panel length for horizontal installations is 96 inches (2438 mm).

1. Panel Thickness: 7/16 inches (11.1 mm).
2. Horizontal Reveal: System to provide a recessed channel reveal of ½ inch (12mm) between panels.
3. Vertical Reveal: System to provide a 1/16 inch (1.5mm) reveal between panels.
4. Panel Edge Finish: Panel edges to be finish with .018 inch (.5mm) PVC edge banding or wood veneer.
5. Panel Finish: Refer to Room Finish Schedule and drawings.
6. Main Laminated Panel Fire Rating:
   a. Fire Rating: ASTM E84, Class A.

7. Tack Board Fire Rating: Resilient tack board as scheduled.
   a. Fire Rating: ASTM E84, Class A.
8. Panel Dimensions: Refer to drawings.
9. Molding: Provide manufacturer's accessories.
   a. #312 Horizontal Divider Molding
   b. #302A Vertical Divider Molding
   c. (#103-90, 103-90F) 90°Outside Corner Molding
   d. (#103-135F & 103-135B) 135°Outside Corner Molding
   e. #304-90 End Cap for top and bottom of 90° outside corner molding
   f. #304-135 End Cap for top and bottom of 135° outside corner molding
   g. #304 Edge Trim Molding
   h. #304A Edge Trim Molding (2-piece)
   i. (#410A-F & 410-A/B) Divider Molding available for use with marker boards, media board, resilient tack board, specialty panels and contour panels.
   j. #412C Chair Rail Top Trim with #412RI flat or #312RI concave reveal insert for use in wainscot height installations
10. Finishes:
    a. Panel Face: (enter finish descriptions here)
       a) 1. Finish #1: Plastic Laminate
    b. Panel Face Pattern Direction: (select one)
       a) 1. Horizontal
    c. Panel Edge Banding: (select one or enter custom color choice)
       a) 2. .5mm PVC Platinum
    d. Aluminum Molding Finish: (select one or enter custom color choice)
       a) 1. Clear Anodize

2.3 MATERIALS

A. High Pressure Decorative Laminates (VGS,VGP,VGF & HGS) and non-decorative backers (BKV) used to surface wall panels systems shall be manufactured to meet or exceed the National Electrical Manufacturing Association (NEMA LD3-2005) for thickness, performance properties and appearance.

B. Medium Density Fiberboard (MDF): 45# density shall be used in Class III panel composition. Fire-rated MDF shall be used for Class I and Class II panel compositions (refer to AWI Section 200)

C. Bulletin Board:
   1. Linoleum resilient homogeneous tackable surface material shall be of natural materials consisting linseed oil, granulated cork, resin binders and dry pigments, mixed and bonded to a natural jute backing.
   2. Linoleum as scheduled in the Room Finish Schedule or as indicated on the drawings.
   3. Resilient tackable panel from manufacturer’s standard line.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared according to AWI 1700-G-3.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 FIELD DIMENSIONS

A. Where wall system is indicated to be fitted to other construction, check actual dimensions of other constructions by accurate field measurements before manufacturing wall system; show recorded

measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

B. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of wall system without field measurements coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

3.3 PREPARATION

A. Panels must be acclimated to ambient temperature and humidity conditions in accordance with manufacturer’s specifications prior to installation. Refer to PSI installation guide for proper, handling, storage and acclimation procedures.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Prepare existing wall by removing all items. Grind and projections on wall to provide substrate within specified tolerances.

3.4 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Field cutting of all wall systems should be accomplished using carbide tools. All face penetrations and cutouts should have a minimal 1/8 inch (3 mm) radius in corners according to NEMA Standards Publication LD 3-2005.

C. All wall systems should receive an "S" bead of panel mastic on the back of the panel during installation.

D. Fasten all trim pieces and supports to existing concrete block with appropriate fasteners, Tapcon or similar.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sound-absorbing panels.

B. Sound-Diffusing ceiling panels.

C. Mounting accessories.

1.2 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications for Uni-strut supports.

B. Section 07 9200 - Joint Sealants.

C. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

D. Section 09 9123 - Interior Painting.

E. Divisions 22, 23, and 26 for fire alarm, air outlets and inlets, and light fixtures

1.3 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.

D. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.

E. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch (305 by 305 mm), showing construction, edge details, and fabric covering.

F. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

G. Manufacturer's Qualification Statement.

H. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Panels: Quantity equal to 5 percent of total installed, but not less than one of each type.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company with not less than five years of experience in manufacturing acoustical products similar to those specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.

B. Store units flat, in dry, well-ventilated space; do not stand on end.

C. Protect edges from damage.

1.7 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for additional mock-up requirements.

B. Construct mock-up of acoustical units at location as indicated by Fuller and D'Angelo P.C..
   1. Minimum mock-up dimensions; 96 by 96 inches (2440 by 2440 mm).
   2. Approved mock-up may remain as part of the Work.

1.8 WARRANTY

A. Warranty: Provide manufacturer's standard warranty against manufacturing defects in material or workmanship when installed in accordance with the current CISCA Handbook and ASTM C367:
   1. Conwed Technology: Warranty Period: 3 years.
   2. Acoustics First: Warranty Period: 3 years.

PART 2 PRODUCTS

2.1 SOUND-ABSORBING UNITS

A. Manufacturers:
   1. Conwed Designscape, Foundations Ceiling Panel.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Sound Absorbing Units: Prefinished, factory assembled Soft texture Finish
   1. Core fiberglass density: 6-7 pcf
   2. Core laminated with 1/8" 16-20 pcf molded glass fiber
   3. Core thickness: 4-1/8"
   4. Size: 24 x 24 inches.
   5. Corners: Square
   6. Edge treatment: Resin hardened
   7. Edge profile: Square
   8. Finish: Soft Texture, white
   9. Mounting: Lay-in panel for suspended ceiling system, exposed grid.
      a. Suspension System: Specified in Section 09 5100.
   10. Surface Burning Characteristics: Class A rating, Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

C. Substitutions: See Section 01 2500 - Substitution Procedures.

2.2 THERMOPLASTIC - SOUND DIFFUSING UNITS

A. Manufacturers:
   1. Acoustics First Corporation, Richmond, VA, 1 800 765 2900. Quadratic residue diffuser, Model Q..

B. ThermoPlastic Acoustical Panels for Ceilings:
   1. Fire rating: Class 1(A) per ASTM E84.
   2. Noise Reduction Coefficient (NRC):.30 when tested in accordance with ASTM C423
   3. Core fiberglass density: 6-7 pcf
   4. Core thickness: 4-0"
   5. Panel Size: 24 inches by 24 inches (610 mm by 610 mm).
   6. Surface Pattern: Recesses angled at 10 degrees..
   7. Color: White
   8. Mounting: Lay-in panel for suspended ceiling system, exposed grid.
      a. Suspension System: Specified in Section 09 5100.

2.3 FABRICATION

A. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch (1.6 mm) for thickness, overall length and width, and squareness from corner to corner.

2.4 ACCESSORIES

A. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each acoustical unit, sized appropriately for weight of acoustical unit.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.
   1. Alternate sound diffusing panels and sound absorptive units in ceiling grid.

B. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

C. Suspend ceiling panels at locations and in directions and heights as indicated.

D. Install acoustical units to construction tolerances of plus or minus 1/16 inch (1.6 mm) for the following:
   1. Plumb and level.
   2. Flatness.

3.3 CLEANING

A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.4 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Fuller and D'Angelo P.C..

END OF SECTION

EXTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

1. Roof ladders.
2. Exterior steel frames and doors.
3. Steel stairs, platforms, railings, and mesh, etc.
4. Exposed surfaces of steel lintels and ledge angles.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 05 1200 - Structural Steel Framing.

C. Section 05 5000 - Metal Fabrications: Shop-primed items.

D. Section 05 5100 - Metal Stairs: Shop-primed items.

E. Section 09 9123 - Interior Painting.

F. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Painted identification.

G. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Color coding scheme for items to be painted under this section.

H. Section 32 1723.13 - Painted Pavement Markings: Painted pavement markings.

1.4 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.5 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

F. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

G. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).

H. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").

2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
2. Where sheen is not specified, discuss sheen options with Fuller and D'Angelo P.C. before preparing samples, to eliminate sheens definitely not required.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five (5) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three (3) years experience.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide door and frame assembly illustrating paint color, texture, and finish.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer.

B. Paints:
1. Base Manufacturer: Benjamin Moore & Co.

C. Substitutions: See Section 01 2500 - Substitution Procedures

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.

2.3 PAINT SYSTEMS - EXTERIOR

A. Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. One coat of latex primer.
   2. Semi-gloss: Two coats of latex enamel; P29.

B. Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Semi-gloss: Two coats of alkyd enamel; P29.

C. Galvanized Metals, Alkyd, 3 Coat:
   1. One coat galvanize primer.
   2. Semi-gloss: Two coats of alkyd enamel; Intermediate coat: Super spec HP Alkyd semi-gloss (P24). Finish coat: Super spec HP DTM Alkyd semi-gloss (P24).

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

H. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and SSPC-SP 3. Protect from corrosion until coated.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Sand metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

INTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
2. Elevator pit ladders.
3. Steel doors and frames.
4. Exposed steel trusses, metal deck, steel beams, columns ans miscellaneous structural steel.
5. Concrete.
6. Concrete masonry units (CMU), concrete block.
7. Gypsum Board/Plaster walls, soffits, and ceilings.
8. Metal stair and railings.
9. Metal trim and specialty items
10. Exposed surfaces of steel lintels and ledge angles.
11. Mechanical and Electrical:
    a. In finished areas, including gymnasium, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    b. In finished areas, paint shop-primed items.
    c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    d. On the roof and outdoors, paint all new, equipment, and dunnage that is exposed to weather or to view, including that which is not factory finished.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
6. Marble, granite, slate, and other natural stones.
7. Floors, unless specifically indicated.
8. Ceramic and other tiles.
9. Brick, architectural concrete and cast stone.
10. Glass.
11. Acoustical materials, unless specifically indicated.
12. Concealed pipes, ducts, and conduits.

1.3 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 05 1200 - Structural Steel Framing.

C. Section 05 2100 - Steel Joist Framing.

D. Section 05 3000 - Metal Deck.

E. Section 05 5000 - Metal Fabrications: Shop-primed items.

F. Section 05 5100 - Metal Stairs: Shop-primed items.

G. Section 09 9113 - Exterior Painting.

H. Section 22 0480 - Tags, Charts And Identification: Color coding scheme for items to be painted under this section.

I. Section 23 0480 - General Labeling, Valve Charts And Piping Identification: Color coding scheme for items to be painted under this section.

J. Section 26 0550 - General Labeling And Identification: Color coding scheme for items to be painted under this section.

1.4 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.5 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

F. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).

G. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).

H. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Fuller and D'Angelo P.C. before preparing samples, to eliminate sheens definitely not required.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 10 years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 4 feet (1.21 m) long by 4 feet (1.21 m) wide, illustrating paint color, texture, and finish.

C. Provide door and frame assembly illustrating paint color, texture, and finish.

D. Locate where directed by Architect.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Fuller and D'Angelo P.C. is obtained using the specified procedures for substitutions. Refer to Section 01 2500 - Substitution Procedures for additional requirements.

B. Paints:
   1. Base Manufacturer: Benjamin Moore & Co: www.benjaminmoore.com..

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: 01 2500 - Substitution Procedures.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   5. Supply each paint material in quantity required to complete entire project's work from a single production run.
   6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Fuller and D'Angelo P.C. from the manufacturer's full line.

E. Colors: As indicated on drawings.
   1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.3 PAINT SYSTEMS - INTERIOR

A. All Interior surfaces indicated to be painted, unless otherwise indicated; Including gypsum board, concrete masonry and shop primed steel.
   1. Two top coats and one coat primer for new surfaces.
   2. One top coat and one coat primer for existing surfaces.
   3. Primer(s): As recommended by manufacturer of top coats.

B. Concrete/Masonry, Opaque, Latex, 3coat: (New surfaces)
   1. One coat of block filler. Super Craft No. 285
   2. Semi-gloss: Two coats of latex enamel. Super spec Moore: # 276

C. Concrete/Masonry, Opaque, Latex, 2 coat: (Existing surfaces)
   1. One coat of latex primer sealer. Fresh Start All purpose primer. (# 046)
   2. Semi-gloss: One coat of latex enamel. Super spec Moore: # 276

D. Ferrous metals, not primed, Acrylic Latex, 3 coat:
   1. One Coat latex primer.
   2. Semi-gloss: 2 coats of Super Spec HP DTM Acrylic (P29),
   3. or 2 coats of Super Spec Interior Latex (276)

E. Ferrous metals, primed, Acrylic Latex, 2 coat:
   1. Touch up with latex primer.
   2. Semi-gloss: 2 coats of Super Spec HP DTM Acrylic (P29),
   3. or 2 coats of Super Spec Interior Latex (276)

F. Gypsum Board/Plaster, Latex, 3 coat: (New Surfaces)
   1. One coat of Moore Super Spec Latex Enamel Undercoater & Primer Sealer.(253)
   2. Semi-Gloss: 2 coats of Latex Enamel; Moore Super Spec Interior Latex (276)

G. Gypsum Board/Plaster, Latex, 2 coat: (Existing Surfaces)
   1. One coat of Alkyd Primer sealer, Moore Super Spec Latex Enamel Undercoater & Primer Sealer.(253)
   2. Semi-Gloss: 1 coats of Latex Enamel; Moore Super Spec Interior Latex (276)
   3. Eggshell: 1 coats of Latex Enamel; Moore Super Spec Interior Latex # C274

H. Concrete Floor Surface, Urethane modified alkyd resin, 1 coat (Existing surfaces)
   1. High Gloss: 1 coat of Moore Porch & Floor Enamel, # C112.

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
   4. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Clean concrete according to ASTM D4258. Allow to dry.
   3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

G. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

J. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

K. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

L. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and SSPC-SP 3. Protect from corrosion until coated.

M. Cleaning Existing Walls: Remove all loose paint, plaster and other coatings.
1. Working from bottom to top, apply prepared cleaning solution to a dry surface.
2. Leave solution on the surface for 5-20 minutes. If solution begins to dry, reapply.
3. Gently scrub heavily soiled areas.
4. Rinse thoroughly with clean water with by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip.
5. Apply after wash. Let the Afterwash stay on the surface for three to five minutes.
6. Pressure rinse from the bottom of the treated area to the top.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Markerboards and Tackboards.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

1.4 REFERENCE STANDARDS

A. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

D. Samples: Submit color charts for selection of color and texture of markerboard, tackboard surface covering, and trim.

E. Manufacturer's printed installation instructions.

F. Maintenance Data: Include data on regular cleaning, stain removal .

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Porcelain Enamel Markerboard Warranty: Submit a written warranty executed by manufacturer agreeing to replace porcelain enamel markerboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking within the specified warranty period, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.

1. Warranty Period: 50 years from date of Substantial Completion

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Visual Display Boards:

1. ASI Visual Display Products, www.asi-visualdisplayproducts.com
   a. Fixed Markerboards: Series 800.
   b. Tackboards: Series 800
2. Substitutions: See Section 01 2500 Substitution Procedures.

2.2 VISUAL DISPLAY BOARDS

A. Markerboards: Porcelain enamel on steel, laminated to core.
   1. Color: White.
   2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch (0.61 mm).
   3. Core: fibreboard, particle board or MDF, 7/16 inch (1.09 mm) thick, laminated to face sheet.
   4. Backing: 32 gage Galvanized steel sheet, laminated to core.
   5. Size: As indicated on drawings.
   6. Frame: Extruded aluminum, with concealed fasteners.
   7. Frame Profile: As indicated on drawings
   8. Frame Finish: Anodized, natural.
   9. Accessories: Provide:
      a. Aluminum chalktray for each markerboard.
      b. Map Rail: Furnish map rail at top of each unit, complete with the following accessories:
         a) Display Rail: Provide continuous cork display rail, 2 inches (50 mm) wide integral with map rail.
         b) End Stops: Provide one end stop at each end of map rail.
         c) Map Hooks: Provide 2 map hooks for every 48 inches of map rail or fraction thereof.
         d) Flag Holder: Provide one flag holder for each room

B. Tackboard:
   1. Vinyl Fabric laminated to fiberboard.
   2. Cork Thickness: 7/16 inch (1.09 mm).
   3. Fabric: Vinyl coated fabric.
   4. Color: As selected from manufacturer's full range.
   5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
   6. Size: As indicated on drawings.
   7. Frame: Same type and finish as for markerboard.
      a. Frame Profile: Same type as for fixed markerboard
      b. Frame Finish: Same finish as for fixed markerboard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Secure units level and plumb.

C. Butt Joints: Install with tight hairline joints.

D. Surfaces to be covered must be clean, smooth, dry, uniform in color and structurally sound.
   1. covered must be clean, smooth, dry, uniform in color and structurally sound.

E. Wall Covering: in accordance with manufacturer's instructions.
   1. Clean ballpoint pen ink, wax crayon, ink marker, oil-based stains, or any foreign matter that may bleed through wall covering and prime with a stain blocking primer/sealer.

2. Remove any substrate mildew with a chlorine bleach solution, rinse, and allow to dry before installing. Wash greasy walls with an ammonia solution, rinse, and allow to dry before installing.
3. overlap the edges at least 2", double cut all seams.
4. Vertical joints should not occur less than 6" from the outside and inside corners

3.3 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

DISPLAY CASES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

A. This Section includes the following:
   1. Illuminated display cases.
   2. Accessories.

B. Related Sections: The following sections contain requirements that relate to this section:
   1. Division 10 Section "Visual Display Boards" for chalkboards and tackboards.
   2. Division 26 Sections for wiring and other electrical work associated with illuminated display cases.

1.3 DEFINITIONS

A. Bulletin Board: Tackable surface enclosed in a glazed cabinet.

B. Display Case: Glazed cabinet with adjustable shelves.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Provide anchorage of display cases capable of withstanding the effects of earthquake motions determined according to the State of Connecticut Building Code and indicated on structural drawings..

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes. Include manufacturer's data substantiating that tackboard materials comply with requirements indicated.

C. Shop Drawings: Provide dimensioned elevations for each type of display case and bulletin board required; include large-scale sections of typical members and other components. Show anchors, grounds, reinforcement and layout, and indicate finishes.
   1. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as a unit of Work in other Sections
   2. Show location of tack assembly seams and joints.
   3. Wiring Diagrams: Power, signal, and control wiring for illuminated units.

D. Samples: Provide the following samples of each exposed material, including message strips, letters, and other graphics, for initial selection of colors, patterns, and textures, as required, and for verification of compliance with requirements indicated.
   1. Samples for selection of color, pattern, and texture:
      a. Vinyl-fabric-faced Cork Tackboards: Manufacturer's color charts consisting of actual sections of vinyl fabric, showing the full range of colors, textures, and patterns available for each type of vinyl-fabric-faced cork tackboard indicated.
   2. Aluminum Trim and Accessories: Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate, showing the full range of colors available.

E. Certificates: In lieu of laboratory test reports, when permitted by the Architect, submit the manufacturer's certification that vinyl-fabric-faced cork tackboard materials furnished comply with requirements specified for flame spread ratings.

F. Maintenance Data: For tack assemblies to include in maintenance manuals

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is an authorized representative of the building directory manufacturer for installation and maintenance of the manufacturer's products.

B. Fire-Test-Response Characteristics: Provide fabrics with the surface-burning characteristics indicated, as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Flame Spread: 25 or less.
   2. Smoke Developed: 10 or less.

C. UL and NEMA Compliance: Provide lighting fixtures and electrical components for illuminated building directories that are labeled and listed by UL and comply with applicable NEMA standards.

1.7 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of the following:
   1. Claridge Products and Equipment, Inc. or equivalent.
      a. Display Cases: Model 390.
      b. Bulletin Board Cabinets: Revere Deluxe Series Bulletin Board Cabinets.
   2. Section Section 01 2500 Substitution Procedures

2.2 MATERIALS

A. Aluminum Extrusions: Provide manufacturer's standard heavy duty extruded aluminum sections with not less than the strength and durability properties specified in ASTM B 221 for 6063-T5 alloy.

B. Tempered Glass: All glass shall be clear, tempered safety glass complying with the requirements of ASTM C 1048, Kind FT, Condition A, Type I, Class 1 - transparent.

C. Vinyl-Fabric-Faced Tackboard: Provide mildew-resistant, washable, vinyl fabric complying with FS CCC-W-408, Type II, laminated to 1/4-inch-thick cork sheet. Provide fabric with a flame spread rating of 25 or less when tested in accordance with ASTM E 84. Provide color and texture as selected from the manufacturer's standards.

2.3 DISPLAY CASE

A. Recessed, Plywood-Framed Cabinet: Factory-fabricated cabinet, with top, bottom, and sides fabricated from hardwood veneer plywood; with tack assembly on back inside surface, glazed doors at front, and 2-by-2-inch extruded-aluminum angle trim on face to cover edge of recessed opening.
   1. Aluminum Finish: Clear anodic.

B. Glazed Sliding Doors: 1/8” minimum thickness, tempered glass; unframed; with extruded-aluminum top and bottom track; supported on nylon or ball-bearing rollers; with plastic top guide and rubber bumpers. Equip each door with ground finger pull and adjustable cylinder lock with two keys.
   1. Number of Doors: As indicated on drawings.

C. Shelves: 1/8” thick tempered glass; supported on adjustable shelf standards and supports.
   1. Shelf Width: 12 inches.
   2. Number of Shelves: Three.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112; recess mounted in rear surface. Provide standards full height of display case.

E. Tack Surface: Vinyl-fabric-faced tack assembly.
   1. Color: As selected by Architect from full range of manufacturer's standard colors.
   2. Lighting: Top mounted continuous LED light fixtures, with interior mounted light fixtures and aluminum reflector.

F. Size as indicated on drawings.

2.4 BULLETIN BOARD CABINETS

A. Claridge “Revere Series”, recessed, Bulletin Board Cabinets with hinged door(s).
   1. Tackable Bulletin Board Back Panel: “Fabricork”
   2. Color: Selected from manufacturer's standard bulletin board colors.
   3. Sizes: Custom sizes as indicated on drawings..
   4. Housing: Perimeter trim is 1" x 3" hollow tube aluminum perimeter with satin anodize finish.
   5. Inside depth of cabinet: 1-3/4".
   6. Doors: Hinged doors with 3/16” tempered glass, continuous hinges and flat key tumbler locks. Cabinets up to 3'6” wide to be provided with one door; 4', 5', and 6' cabinets will have two; 7' cabinets have three; and 8' and larger have four doors.

B. Metal Trim and Accessories: Provide heavy gauge extruded aluminum and shall meet or exceed ASTM B221 Alloy Standards.
   1. Finish to be etched and anodized satin finish.
   2. Hanging Devices: Cabinets shall have Z-bar hangers.
   3. Color: Clear Anodize.

C. Recessed installation

2.5 FABRICATION

A. Fabricate bulletin boards and display cases to requirements indicated for dimensions, design, and thickness and finish of materials indicated.

B. Use metals and shapes of thickness and reinforcing to produce flat surfaces, free of oil canning, and to impart strength for size, design, and application indicated.

C. Fabricate cabinets and door frames with reinforced corners, mitered to a hairline fit, with no exposed fasteners.

D. Fabricate exterior units with vents to permit evaporation of moisture trapped inside.

E. Fabricate shelf standards plumb and at heights to align shelf brackets for level shelves.

2.6 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. 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.

D. Metal Trim and Accessories: Provide aluminum extrusions as manufactured by Claridge Products and Equipment, Inc. Trim shall be heavy gauge extruded aluminum and shall meet or exceed ASTM B221 Alloy Standards.

E. Wood Box: 16" oak grained low pressure laminate.

F. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

G. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

PART 3 - EXECUTION

4.1 EXAMINATION

A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of work.

B. Examine walls and partitions for proper backing for bulletin boards and display cases.

C. Examine walls and partitions for suitable framing depth where recessed units will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected

4.2 INSTALLATION

A. General: Install units in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Recessed Display Cases: Attach units to wall framing with fasteners at not more than 16 inches o.c. Attach aluminum trim over edges of recessed display cases and conceal grounds and clips. Attach trim with fasteners at not more than 24 inches o.c.

C. Securely attach to the supporting structure with concealed fasteners, in accordance with the manufacturer's installation instructions.

4.3 CLEANING

A. Adjust doors to operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

B. Touch up factory-applied finishes to restore damaged or soiled areas PROTECTION

C. Protect installed bulletin boards and display cases from damage until acceptance by the Owner.

END OF SECTION

SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Room and Corridor Door signs.

B. Interior Directional and Informational signs.

C. Emergency evacuation maps.

1.3 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls for temporary Project identification signs and for temporary information and directional signs

B. Section 01 5813 - Temporary Project Signage.

C. Section 04 2000 - Unit Masonry: For signage on fire walls above finished ceilings.

D. Section 09 2116 - Gypsum Board Assemblies: For signage on fire walls above finished ceilings.

E. Section 14 2100 - Electric Traction Elevators: Modernization for code-required elevator signage.

F. Section 14 2400 - Hydraulic Elevators: Modernization for code-required elevator signage.

1.4 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
2. Submit for approval by Port Chester-Rye UFSD through Fuller and D'Angelo P.C. prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Verification Samples: Submit samples showing colors specified.

F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Store tape adhesive at normal room temperature.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of metal or polymer finishes beyond normal weathering.
      b. Deterioration of embedded graphic image colors and sign lamination.
   2. Warranty Period: 5 years years from date of Substantial Completion

PART 2 PRODUCTS

2.1 PANEL SIGN

A. Manufacturers
   1. Flat Signs:
      a. Crown Signs, 4 Executive Plaza, Yonkers, NY 10701; (914) 375-2118.
   2. Substitutions: Section 01 2500 Substitution Procedures.

B. Manufacturer’s standard monolithic tactile plaque constructed utilizing a thermoforming process, which provides a fully homogeneous plaque sign. The sign body, face, raised text and Braille are compression molded to form a single dimensional component that results in a sign surface that exhibits a toughness that resists scratching, cracking, gouging and graffiti.
   1. Style: Identification: Photopolymer Signs with raised lettering is physically attached, not laminated to the face plate.
      a. Sign to be satin Braille and pictograms raised. "Tipping" shall be provided where just the tips or the raised areas are finished providing an extra layer of protection to the sign and paint.
      b. Provide VHB Tape, holes drilled/countersunk for mounting,, back plates, and window areas for paper inserts.
   2. Material: Extruded Engineered PVC/Acrylic alloy with Integral background colors and high impact resistance with Class A Fire Rating.
   3. Sign Thickness: 1/8 inch (3mm).
   4. Lettering/ Tactile Characters/Symbols: Integral Raised 1/32 inch (1 mm) from sign plate face
   5. Lettering Style: Typeface as selected from the manufacturer’s standard sans serf or simple serf typefaces, upper case letters, as indicated on drawings.
   6. Braille: Grade 2 braille, placed directly below last line of letters or numbers
   7. Contrast: Letters, numbers and symbols shall contrast with background.
      a. Provide three standard colors
   8. Milled slot with lexan cover for paper insert where indicated.
   9. Edge Treatment:
      a. Profiles: Standard 0.5" Radiused Corner
   10. Color of Background: As selected from manufacturer’s standard background colors to match existing.
   11. Color of Text and Raised Characters: As selected from standard colors to match existing.
   12. Surface Texture: Matte

C. Interior: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
   1. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

a. Raised copy color - Identification letters require second color, to be selected by Architect.
b. Provide name slots as indicated.

2. Fasteners: Use fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
   a. All fastener shall one way security torx head type.
3. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for installations as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work
4. Substitutions: Section 01 2500 Substitution Procedures.
5. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for installations as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work

2.2 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

D. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
   1. Plastic (self-extinguishing material) engraving stock with face and core piles in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standard.

2.3 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
   1. Flame Spread: Less than 25.
   2. Smoke Development: Less than 450

B. Room and Door Signs: Refer to schedule on drawings.
   1. Character Height: As shown on drawings.
   2. Sign Height: As shown on drawings.
   3. Total Frame depth: 3/8 inch.
   4. Name slot height: 7/8 inch.
   5. Classroom and Office Doors: Identify with As shown on drawings.; in addition, provide "window" section for replaceable occupant name.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
   7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
   8. Rest Rooms: Identify with pictograms, the names as shown on drawings and braille.

C. Interior Directional and Informational Signs:
   1. Sign Type: Same as room and door signs.
   2. Sizes: As indicated on drawings.

3. Wording of signs is indicated on drawings.
4. Where suspended, ceiling mounted, or projecting from wall signs are indicated, provide two-sided signs with same information on both sides.

D. Provide for locations and rooms to be determined later, an additional:
1. Ten (10) type 'A' signs;
2. Twenty (20) type 'B' signs
3. Twenty (20) type 'D' signs for way finding to be determined at a later

E. Emergency Evacuation Maps:
1. To be furnished and installed by the Owner.

2.4 SIGN TYPES

A. Flat Signs: Signage media in aluminum frame.
1. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
2. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.

B. Radius / Curved Signs: One-piece, curved extruded aluminum media holder securing flat, flexible sign media by curved lip on two sides; other two sides closed by end caps; concealed mounting attachment.
1. Sizes: As indicated on drawings.
2. Finish: Natural (clear) anodized.
3. Wall Mounting of One-Sided Signs: Mechanical anchorage, with predrilled holes, and set in clear silicone sealant.
4. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
5. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.

C. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica, Arial, or other sans serif font.
2. Character Case: Upper case only.
3. Background Color: As selected by Architect.
4. Character Color: As selected by Architect color.

2.5 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
1. Total Thickness: 1/8 inch (3 mm) exclusive of raised soppy.

B. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
1. Total Backer Thickness: 1/16 inch (1.56 mm).
2. Letter Thickness: 1/16 inch (1.56 mm).
3. Letter Edges: Square.

2.6 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All signs to be mechanically fastened and taped.

C. Install neatly, with horizontal edges level.

D. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

E. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Solid polymer toilet compartments. (HDPE Toilet Partitions and NFPA 286 certification)

B. Urinal screens. NFPA 286

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 10 2800 - Toilet And Bath Accessories.

1.4 REFERENCE STANDARDS

A. NFPA 286 certification

B. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials

1.5 PERFORMANCE REQUIREMENTS

A. HDPE Toilet Partitions and NFPA 286 certification

B. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84:

1. Smoke Developed Index: Not to exceed 450.
2. Flame Spread Index: Not to exceed 75.
3. Material Fire Ratings:
   a. National Fire Protection Association (NFPA): Class B
   b. International Code Council (ICC): Class B
4. Heat Sink: Aluminum heat sink to dissipate heat from incendiary devices used by vandals. Attached to bottom of all doors and panels.

1.6 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer’s Qualifications: A Company or Individual, regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Manufacturer's Installation Instructions: Indicate special procedures.

D. Manufacturer’s guarantee.

1.9 WARRANTY

A. Manufacturer's guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: ASI Global Partitions, which is located at: 2171 Liberty Hill Rd. ; Eastanollee, GA 30538; Tel: 706-827-2700; Fax: 706-827-2710; Email: request info (sales@globalpartitions.com); Web: www.globalpartitions.com
   1. Substitutions: Refer to01 2500 Substitution Procedures.

2.2 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE) resins, overhead braced. **(Floated HDPE is not acceptable.)**
   1. Color/Texture: Pebble Green.

B. Doors:
   1. Thickness: 1 inch (25 mm).
   2. Width: 24 inch (610 mm).
   3. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
   4. Height: 55 inch (1397 mm).

C. Panels:
   1. Thickness: 1 inch (25 mm).
   2. Height: 55 inch (1397 mm).

D. Pilasters: Pilasters shall be 81-1/2” high finished height. Pilasters shall include a mounting system comprised of a one piece 304 stainless steel with #4 finish 3” high shoe with an integral plate in the bottom. The shoe shall be mounted to the floor utilizing concrete anchors supplied by Global Partitions or equal. The concrete anchors shall be driven through the plate affixing it to the concrete floor. The concrete anchors shall have 2700lbs of holding strength when used in 5000psi concrete flooring. The pilaster height shall be adjusted by utilizing the machine thread bolt supplied which is placed into a metal insert installed in the bottom of the pilaster at the manufacturing facility.

E. Urinal Screens: To match compartments; mounted to wall with continuous Aluminum panel brackets .

2.3 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches (76 mm) high; concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Manufacture's standard anodized aluminum rail with anti-grip profile.

C. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.

D. Hardware: Satin stainless steel:
   1. Hinges: Heavy-duty 8” aluminum hinge shall have gravity-acting cam. Slide latch, strike/keeper and hinges are through bolted onto doors and pilasters using stainless steel, vandal-resistant through bolts. Keeper provides for emergency access into the stall by lifting up on the bottom of the door.
   2. Door Latch: Slide type with lift emergency access feature in strike keeper.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.
   6. **Provide door pull both sides of ADA compartments**.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

D. Start of work constitutes acceptance of job.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch (9 mm to 13 mm) space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. All panels shall typically be mounted at 14" above finished floor

G. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch (6 mm).

B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.4 ADJUSTING/CLEANING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

D. Finished surfaces shall be cleaned after installation and be left free of all imperfections.

3.5 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

WIRE MESH PARTITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Wire mesh systems for walls and stairways.

B. Gates.

1.3 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Cylinders for locksets.

1.4 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

D. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2013.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for mesh materials, finishes, and hardware.

C. Shop Drawings: Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of hardware. Provide component details, anchorage, and type and location of fasteners.

D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

B. Installer Qualifications: Experienced in installation of the work of this section with minimum of five (5) years..

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wire Mesh Partitions:

1. Acorn Wire and Iron Works, Inc: www.acornwire.com/#sle.

2.2 WIRE MESH PARTITIONS

A. Wire Mesh Partitions: Factory-fabricated modular assemblies of panels, doors, anchors, hardware, and accessories as required to provide a complete system.

1. Design Criteria:

a. Design partition system to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to design loads.

b. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.3 COMPONETS

A. Woven Wire Mesh: Heavy duty.
   1. Material: ASTM A510/A510M uncoated crimped steel wire.
   2. Wire Size: 6 gage, 0.192 inch (4.9 mm).
   3. Mesh Opening Size: 2 inch (50 mm) diamond shape.
   4. Mesh Weave: Plain weave, double crimped.

B. Framing and Support Members:
   1. Material: ASTM A36/A36M steel shapes and ASTM A500/A500M cold-formed steel.
   2. Framing, Corner Posts, and Intermediate Support Members: Manufacturer's standard sizes for system specified and as indicated on drawings.
   3. Vertical Stiffeners: As required for partitions greater than 144 inches (3658 mm) in height.

C. Doors: Same material as partitions, fully framed; manufacturer's standard construction and hardware for swing operation.
   1. Hinged door fr ames 1-1/4" x 3/4" channel with 1-1/4" x 1/8" flat bar cover three sides, 1-3/8" x 3/4" x 1/8" angle riveted to lock side. Each door to have 1-1/2 pairs butt hinges riveted to both door and hinge bar
   2. All bolts, hardware, and accessories for complete installation to be included
   3. Locking: Mortise type cylinder locks operated by key outside, recessed knob inside
      a. Lockset to be ND96HD RHO; Finish: 626; Schlage or equal. Permanent cylinder core will be provided by the Owner. Refer to Section 08 7100.

D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.4 FASTENERS

A. Bolts, Nuts and Washers: Hot dip galvanized.

B. Anchorage Devices: Provide power driven, powder actuated, and drilled expansion bolts.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of structure.

2.5 ACCESSORIES

A. Bracing: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

C. Floor and Ceiling Pilaster Shoe: Manufacturer's standard.

2.6 FABRICATION

A. Fit and assemble in largest practical sections for delivery to site, ready for installation.

B. Make exposed joints flush or tight.

C. Provide components required for anchorage to adjacent construction.

D. All partitions to terminate and anchored to at structure above.

2.7 FINISHES

A. Painted Finish: Manufacturer's standard powder coat finish.
   1. Color: Black.

B. Galvanized Finish: In accordance with requirements of ASTM A123/A123M.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrate surfaces.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. After installation, touch-up field welds scratched or damaged surfaces with shop applied finish.

3.3 TOLERANCES

A. Maximum Variation From Plumb or Level: 1/4 inch (6 mm).

B. Maximum Misalignment From True Position: 1/4 inch (6 mm).

3.4 ADJUSTING

A. Adjust doors to achieve free movement.

3.5 CLEANING

A. Remove temporary protection to prefinished surfaces.

END OF SECTION

WALL AND CORNER GUARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Corner guards.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.

B. Section 09 2116 - Gypsum Board Assemblies: Wall Construction

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

C. Samples: Submit two sections of bumper rail, 24 inch (600 mm) long, illustrating component design, configuration, color and finish.

D. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated

E. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project

B. Manufacturer’s qualifications: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.

C. Code compliance: Assemblies should conform to all applicable codes including New York State Building Code

D. Fire performance characteristics: Provide wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class 1 characteristics listed below:

1. Flame spread: 25 or less.
2. Smoke developed: 450 or less.

E. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.

F. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D-1308

G. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.7 DELIVERY, STORAGE AND HANDLING

A. Materials must be acclimated in an environment of 65°-75°F (18°-24°C) for at least 24 hours prior to beginning the installation.

B. Installation areas must be enclosed and weatherproofed before installation commences

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wall and Corner Guards:
   1. Construction Specialties, Inc: www.c-sgroup.com
   2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 COMPONENTS

A. Corner Guards - Surface Mounted:
   1. Material: High impact vinyl with extruded aluminum full height retainer and integral impact absorbing device..
   2. Material: Polyethylene terephthalate (PET or PETG); PVC-free with full height extruded aluminum retainer.
   3. Surface Mounted: Extruded one-piece unit without splices, installed with screws.
   4. Performance: Resist lateral impact force of 100 lbs (445 N) at any point without damage or permanent set.
   5. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   6. Styles: Provide 90 degree corners, 135 degree corners, and wall end protectors.
   7. Width of Wings: 3 inches (76 mm).
   8. Corner: Radiused.
   9. Color: As selected from manufacturer's standard colors.
   10. Length: One piece as indicated on drawings.
   11. Preformed end caps.
   12. Product: Construction Specialties Acrovyn SM-10N 4000

2.3 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on drawings.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Position corner guard 4 inches (100 mm) above finished floor to 96 inches (1200 mm) high.

3.3 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch (6 mm).

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).

END OF SECTION

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

C. Grab Bars

D. Mirror Units.

E. Toilet Tissue Dispenser. (Provided by Owner, Installed by Contractor)

F. Liquid Soap Dispenser. (Provided by Owner, Installed by Contractor)

G. Electric Hand Dryer.

H. Lavatory Protective Enclosure.

I. Surface Mount Sanitary Napkin/Tampon Dispenser.

J. Partition Mounted Sanitary Napkin Disposal.

K. Surface Mounted Sanitary Napkin Disposal.

L. Paper Towel Dispenser. (Provided by Owner, Installed by Contractor)

M. Baby Changing Station

N. Folding Shower Seat.

O. Shower Curtain & Rod.

P. Robe Hook.

Q. Utility Shelf and Mop Holder.

1.3 RELATED REQUIREMENTS

A. Section 10 2113 - Plastic Toilet Compartments.

1.4 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip; 1999 (Reapproved 2009).

D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

G. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.

H. ASTM C1036 - Standard Specification for Flat Glass; 2016.

I. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

J. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.7 WARRANTY

A. Warranty: Contractor shall provide a warranty for two (2) years after the date of Substantial Completion of the Contractor’s work or designated portion thereof. Refer to Article 15 B.1.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: American Specialties, Inc, 441 Saw Mill River Road, Yonkers, NY 10701; 914.476.9000.

B. Substitutions: See Section 01 2500 Substitution Procedures.

C. All items of each type to be made by the same manufacturer, unless noted otherwise.

2.2 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide two (2) keys for each accessory to Port Chester-Rye UFSD; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

F. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.3 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.4 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Provided by Owner, Installed by Contractor.

B. Paper Towel Dispenser: Provided by Owner, Installed by Contractor.

C. Electric Hand Dryer:
   1. Operation: Automatic, IR sensor-operated.
   2. Electrical: 110-120, Volts, 50/60 Hertz, 10.4 Amps max.; 840 - 1000 watts.
   3. Motor: Brush Type Dual Ball Bearings:
      a. HP: 0.67.
      b. RPM: 16,000-29,000 ADJ
      c. Fan Type: Multi Inlet centrifugal.
      d. Heating Element: 325-450Watt with auto reset circuit breaker. Range Adjustable by Owner
      e. Air Flow: 42-60 cfm (-cu m/h).
      f. Air Output Temperature: 131o F ± 5@ 77 degree F.
      g. Decibel Level: 68.9dB-A min @2 min, adjustable by Owner
   4. Drying Time: less than 15 seconds.
   5. Internal resetting automatic thermal protection.
   6. Automatic 60 second shut off.
   7. Self-adjusting time-out and fail-safe off protection controlled by a microprocessor that shall detect and reject false signals and shall automatically self-calibrate to provide uniform sensitivity over its entire life span.
   8. Air Nozzle: Fixed directional heavy-duty, rust proof and highly tamper resistant. Air intake slots shall not allow access to internal parts.
   9. Cover Material: Heavy-duty, one piece formed 18 gage stainless steel satin finished on all exposed surfaces.
   10. Mounting Height: to the bottom of the nozzle.
      a. As indicated on drawings.
   11. Warranty: Unit shall be warranted against defects in materials or workmanship for five (5) years
   12. Manufacturers:
      a. #0199-1-93 Stainless Steel High Speed manufactured by American Specialties .

D. Soap Dispenser: Provided by Owner, Installed by Contractor.

E. Mirrors: Stainless steel angle framed, with 1/4 inch (6 mm) thick tempered safety glass; ASTM C1048.
   1. Size: 18" x 30" tempered glass.
   2. Angle Frame: 3/4" x 5/8", rolled formed,18 gauge, Type 304 stainless steel angle shapes, with mitered and heliarc welded and ground corners; No.4 finish. Mirror to be hung on concealed brackets that locks into top and bottom of frame with tamperproof set screws. One piece backplate attached to frame with theft reistant locking device.
   3. Backing: Full-mirror sized, minimum 0.03 inch (0.8 mm) galvanized steel sheet and 1/8" nonabsorptive filler material.
   4. Product: Model # 20650-B Series (no shelf) manufactured by ASI.

F. Grab Bars: Stainless steel, textured surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force (1112 N), minimum to meet and exceed ADA requirements.
      b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.

d. Snap-On Flange Covers, shall be 22 gauge for concealed mounting, type 304 stainless steel alloy 18-8.

e. Products:

a) ASI Series 3700P, Lengths on drawings

b) ASI Model #60, 18" x 30" L shape Peened surface

G. Combination Sanitary Napkin/Tampon Dispenser: Stainless steel, surface-mounted and recessed as indicated on the drawings.

1. Door: Seamless 0.05 inch (1.3 mm) door with returned edges and tumbler lock.
2. Cabinet: Fully welded, 0.03 inch (0.8 mm) thick sheet.
3. Operation: No charge; no coin slots.
4. Identify dispensers slots without using brand names.
5. Minimum capacity: 30 napkins and 27 tampons.
6. Products:

a. Model #0864 ASI.

H. Sanitary Napkin Disposal Unit: Surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

1. Capacity: 1.5 gallon.
2. Unit shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall have contoured cover finger lift relief and be protected during shipment with PVC film.
3. Full top door shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall be attached to the cabinet at back with a concealed full-width 9/64" diameter heavy-duty stainless steel multi-staked piano hinge spring loaded.
4. Structural assembly of body and door components shall be of welded construction and shall have no exposed fastening devices or spot-welded seams
5. Receptacle: Removable waste container shall be captured internally by full width Z- retainer and shall have a safety-edged finger grip.
6. Product: Model # 0473-A manufactured by ASI.

I. Sanitary Napkin Disposal Unit: Partition Mounted Dual Access Sanitary Napkin Disposal, back-to-back partition mounting with adjustable flanges, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

1. Capacity: 1.5 gallon
2. Unit shall be 22 gauge type 304 stainless steel alloy 18-8 with satin finish and shall have contoured cover finger lift relief and be protected during shipment with PVC film.
3. Doors shall operate independently and shall be attached to cabinet with a full-length 3/16" diameter (Ø4.8) stainless steel multi-staked piano hinge and shall be spring loaded to hold in closed position.
4. International graphic symbol for waste disposal label shall be adhered to doors.
5. Structural assembly of body and door components shall be of welded construction and shall have no exposed fastening devices or spot-welded seams.
6. Face trim mounting flanges shall be of one piece construction 1" (25) wide with no welded miters and shall have square 1/4" (6) returns with an Adjustability range for partition thickness of 1/2" (13) to 3" (76).
7. Waste container shall have hemmed edges for safety and shall be retained by a tumbler lock keyed alike to other ASI washroom equipment and shall have a fully hemmed finger-grip for safety and service removal from one side only.
8. Product: Model # 0472-1 manufactured by ASI.

J. Single Robe Hook: 1/2" x 1" Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate with stainless steel set screws on bottom of perimeter flange of cap plate, for concealed attachment, satin finish.
   1. Product: #7340 -S manufactured by ASI.

K. Diaper Changing Station: Wall-mounted folding stainless steel diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Product: 9012 ASI

2.5 COMMERCIAL SHOWER ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1-1/4 inch (31 mm) outside diameter, 18 gauge wall thickness, satin-finished, with 3 inch (75 mm) outside diameter, minimum 0.04 inch (1.0 mm) thick satin-finished stainless steel flanges, for installation with exposed fasteners.
   1. Products:
      a. 1204-2 ASI with end flanges..

B. Shower Curtain: Double stitched into top seam matte finish, flameproof and stain-resistant. Machine washable vinyl treated with Macrobiotic KV-33 anti-bacterial, anti-fungal and anti-mildew agent, and flame retardant agents
   1. Material: Opaque vinyl, 8 gauge thick, matte finish, flameproof and stain-resistant.
   2. Size: As required, 10% oversized and 6 inches (150 mm) above floor, hemmed edges.
   3. Grommets: Stainless steel; pierced through top hem on 6 inch (150 mm) centers.
   4. Color: White.
   5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
   6. Products:
      a. Curtain:1200-V; Hooks:1200-SHU.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand and rectangular seat.
   1. Seat: Phenolic or polymeric composite one-piece seat with seat slats, of white color, reversible for right or left hans installation
   2. Size: ADA Standards compliant.
   3. Product: #8206 - L/R manufactured by ASI.
   4. Clearance between back of shower seat and wall shall be 1-1/2" (38 mm) to comply with ADA Accessibility Guidelines (ADAAG).
   5. Seat supports shall not come into contact with floor.
   6. Seat shall be able to lock in upright position when not in use.
   7. Mounting: Attached to wall by two 3" diameter mounting flanges constructed of type-304, 3/16" (5 mm) thick stainless steel with satin finish

D. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
   1. Products:
      a. #7340 -S ASI.

2.6 LAVATORY PROTECTIVE ENCLOSURE

A. ADA-conforming, lavatories molded lavatory enclosure..
   1. Molded Ridged vinyl, High-impact, stain-resistant 1/8 in. thick.
   2. Size: As required
   3. Color: China white.
   4. Flammability: UL-94 V-0 Rating.
   5. Fasteners: 7-tamperproof stainless steel.

6. Product: LAV-SHIELDTM as manufactured by TRUEBRO, INC.
   a. Provide factory precut enclosures if available. Coordinate Model # with lavatory specified in Division 22 Plumbing .

2.7 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
   1. Hooks: 4, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
   2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   3. Length: 36 inches (900 mm).
   4. Products:
      a. #1308-3 ASI.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.
   1. Fire Rated in fire rated walls.

C. Accessories.

D. Knox Box

1.3 RELATED REQUIREMENTS

A. 04 2000 - Unit Masonry.

B. Section 05 5000 - Metal Fabrications. Steel lintels.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 09 2116 - Gypsum Board Assemblies.

1.4 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.

C. UL (DIR) - Online Certifications Directory; Current Edition.

1.5 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.7 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers:
   1. Larsens's Manufacturing Co., 7421 Commerce Ln, Minneapolis, MN 55432, (800) 527-7367.
   2. Substitutions: Section 01 2500 Substitution Procedures.

B. Fire Extinguisher Cabinets and Accessories:

1. Larsen's Manufacturing Co; -: www.larsensmfg.com.
2. Substitutions: Section 01 2500 Substitution Procedures.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Refer to Part 3 for Fire Extinguisher Schedule..

2.3 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
1. Formed stainless steel sheet; 0.036 inch (0.9 mm) thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated.
1. Steel; double wall or outer and inner boxes with 5/8 inch (15.9 mm) thick fire barrier material.

D. Metal: Formed stainless steel sheet; 0.036 inch (0.9 mm) thick base metal.

E. Cabinet Configuration: Semi-recessed.
1. Size to accommodate fire extinguishers and accessories.
2. Projected Trim 2-1/2" with standard model flange width

F. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

G. Door Glazing: Plastic, clear, 1/8 inch (3 mm) thick acrylic bubble. Set in resilient channel gasket glazing.

H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

I. Weld, fill, and grind components smooth.

J. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel. and Baked enamel in Science Rooms (fire /blanket cabinet combo unit)

K. Finish of Cabinet Interior: White colored enamel.

2.4 FIRE CABINET ALARM

A. High impact plastic is plunger activated .

B. Provide heavy-duty 9 volt battery.

C. Provide On/off jack for convenient servicing.

D. Provide in all cabinets installed in corridor and public spaces.

E. Product: Larsen's Vigilante Alarm. in corridors only, rooms to have no alarms.

2.5 HIGH SECURITY COMMERCIAL KEY BOX. .

A. Series 3200 “Knox-Box” as manufactured by Knox Co. complying with the following:
1. Recessed mounted with hinged door.
2. Housing: ¼” steel plate housing.
3. Door: ½” thick steel with interior gasket seal.
4. Lock: UL listed, double action rotating tumblers and hardened steel pins accessed by a biased cut key.
   a. Provide 1/8" dust cover with tamper seal.
5. Polyester powder coat color as selected.

2.6 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

B. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.

C. Cabinet Signage: "FIRE EXTINGUISHER".

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, as indicated on drawings from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets and on wall brackets.

3.3 SCHEDULES

A. Fire Extinguishers
   1. Model MP10
      a. Capacity: 10 lbs
      b. Weight: 18 lbs
      c. Cylinder Diameter: 5”
      d. Height: 20”
      e. Width: 7-3/4”
      f. UL rating: 4A-80B: C
      g. Standard Bracket: 5525
      h. Location: in all areas except mechanical and electrical rooms.
   2. Model DC20
      a. Capacity: 20 lbs.
      b. Weight: 38 lbs
      c. Cylinder Diameter: 7”
      d. Height: 23-1/4”
      e. Width: 7-3/4”
      f. UL rating: 2A-C
      g. Standard Bracket: 1007
      h. Location: Mechanical and electrical rooms.
   3. Model DC-10
      a. Capacity: 10 lbs.
      b. Weight: 18 lbs
      c. Cylinder Diameter: 5”
      d. Height: 20”
      e. Width: 8.5”
      f. UL rating: 60B-C
      g. Standard Bracket: 5525
      h. Locations: Science and science prep rooms.

B. Fire Extinguisher Cabinets.
   1. Larson's Cameo Series C3216 RL semi recessed design suitable for fire extinguishers specified.

2. Trim: 2-1/2" Rolled
3. Acrylic Bubble.
4. Finish: Stainless Steel #4 satin finish.
5. Cabinet Alarm: Larsen's "Vigilante". Provide on each corridor cabinet.
6. Bubble Construction: High impact plastic with white lettering.
7. Plunger operated.
8. On/Off service switch.
9. Include heavy duty 9 Volt battery

C. Fire Blanket/Extinguisher Combo Cabinets
1. Larson's FB 36-12 RM semi recessed mounted.
2. Door - Solid (no glass/acrylic bubble)
3. Finish White baked enamel with Red Letters (Science Rooms)

END OF SECTION

LOCKERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Metal lockers.

B. ADA Lockers: 5% of each locker types shall be ADA compliant. Location as selected by Owner..

C. Metal tops and filler panels.

D. Locker benches.

E. Multi-User Digital Lock System.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete base construction.

B. Section 06 1000 - Rough Carpentry: Wood blocking and nailers.

1.4 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.

C. Shop Drawings: Indicate locker plan layout, numbering plan, combination lock code, and key codes.

D. Full Size Sample: One full-size locker of each construction specified for evaluation of construction.

E. Sample of locker bench finish.

F. Submit manufacturer’s published lock-locker compatibility matrix showing that lock is compatible with locker model specified.

G. Manufacturer's Installation Instructions: Indicate component installation assembly.

H. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain locker units and accessories through one source from a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten (10) years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least five (5) years of documented experience and approved by manufacturer for installation of units required for this Project.

D. Locker manufacturer shall be a participant in the compatibility program offered by the Master Lock Company - “ Lock-Locker Compatibility Program” . Locker manufacturer shall perform the following reviews per the requirements of the Master Lock Lock-Locker Compatibility Program:

1. Annual Compatibility Review: Manufacturer shall publish a matrix which indicates each locker model and which Master Lock products are compatible with each locker.
2. Manufacturer shall administer a program which randomly checks lock-locker compatibility during locker production to assure that the locker doors are properly prepped for the lock in accordance with the lock manufacturer standards, that the locks fit, and the lock-locker assembly operates.

1.7 MOCK-UP

A. Provide mock-up of one full size locker, each locker tier with sloped top, in selected colors, with Digital Lock system

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

1.9 WARRANTY

A. Manufacturer shall warrant the lockers for ten (10).

1. Warranty shall all include all defects in material and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Lockers:

1. Lincora Group.53 Series "Liberty" Lockers 3 Points latch All welded www.lincora.com, 1 800 564 9001.
2. ASI Storage Solutions, Competitor Colleection Series, American Specialties, Inc, 441 Saw Mill River Road, Yonkers, NY 10701; 914.476.9000
3. Substitutions: Section 01 2500 Substitution Procedures.

2.2 LOCKER APPLICATIONS

A. Type -1; -: Single tier metal lockers, on concrete base.

1. Width: 18 inches (- mm).
2. Depth: 18 inches (450 mm).
3. Height: 72 inches (1,830 m).
4. Fittings: Hat shelf, 2 coat hooks.
5. Single point latch
6. Locking: Built-in digital keypad locks. Multi-user
7. Provide sloped top, where not recessed.
8. Perforated top and bottom.

B. Type--2: Three tier metal lockers, on concrete base.

1. Width: 15 inches (375 mm).
2. Depth: 15 inches (380 mm).
3. Height: 72 inches (1,830 m).
4. Fittings: 2 coat hooks.
5. Single point latch
6. Locking: Built-in digital keypad locks. Multi-user
7. Provide sloped top, where not recessed.
8. Diamond perforated.

C. Locker Benches: Stationary type; bench top of oak; painted steel pedestals.

1. Height: As indicated on drawings.
2. Length: As indicated on drawings.

2.3 METAL LOCKERS

A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.

1. Where ends or sides are exposed, provide flush panel closures.
2. Provide filler strips where indicated, securely attached to lockers.
3. Color: To be selected by Fuller and D'Angelo P.C.; allow for contrasting colors for locker bodies and doors.

B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
1. Top: 22 gage, 0.03 inch (.75 mm).
2. Bottom: 22 gage, 0.03 inch (.75 mm).
3. Sides: 24 gage, 0.0239 inch (0.61 mm).
4. Back 24 gage, 0.0239 inch (0.61 mm).
5. Frame: 16 gage, 0.06 inch (1.5 mm).
6. Door: 16 gage, 0.06 inch (1.5 mm).
7. Door Stiffener: 18 gage, 0.048 inch (1.2 mm).
8. Shelves: 22 gage, 0.03 inch (.75 mm).
9. Latch Hook: 12 gage, 0.105 inch (2.6 mm).
10. Hinges: 16 gage, 0.075 inch (1.65 mm).
11. Sloping Top: 20 gage, 0.036 inch (.75 mm).

C. Bottom: The bottom is made from galvanized steel 0.30 (+/- 0.05) ounce per sf., sloped and perforated for drainage. The lateral and back flanges are bent 90 degrees downward and the front flange of the bottom is double layered to equal a 16 gauge thick lower frame. The front and is made with a sequence of 4 bends to create a full width door strike fitted with a riveted door bumper. The bottom is welded to the body.

D. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
1. The frame steel strip bent three times 90 degrees. The corner joints are securely spot welded.

E. Door: Flush mounted door is made from a solid 16 gauge, single sheet of cold rolled steel with a double bend vertically on both sides and single bends horizontally at the top and bottom

F. Door Stiffener: The full height door stiffener, bent three times vertically and with a single bend at the top and bottom. The stiffener is spot welded to the inner side of the door panel and MIG welded to the hinged side of the door thus preventing distortion

G. Continuous Hinges: Full length 16 gauge steel piano hinge welded to door and frame.

H. Sloping Top: The sloping top is bent at angle in the front and back to be fixed to the body. Bent steel obturators are used to close openings at each row end. The sloping top is held by supports at every three (3) feet. The sloping top and obturators are fixed to the body by pop-rivets

I. Back; The back is formed using a single sheet of 24 gauge steel and welded to the body. The back is assembled inside the flanges of the sides. The bottom edge is bent 90 degrees inward by no less of 3/4"

J. Sides: The rear ends of the 24 gauge sides are bent 90 degrees inward and welded to the back panel. The front ends are welded to the front frames and are offset to create an outside flush and smooth surface.

K. Shelf: The back and sides are bent 90 degrees downward and spot welding with the sides and back. The front side of the shelf is double flanged at 90 degree ended by a 180 degree flattening crease.

L. Latching: The latching mechanism shall be a finger lift control and constructed of 12 gauge steel encased in a nylon cover with a generous finger pull. The spring activated nylon slide latches are completely enclosed in the lock channel allowing the door to close even in a locked position. This latching system is designed for use with a Digital lock.

M. Door Handle: The handle is made from steel. Finish: Stainless steel.

N. Bumpers: Two (2) 1/2" dia. polypropylene bumpers riveted to the top and bottom door strikes of the locker.

O. Coat Hooks: Lockers are equipped with at least three (3) single hooks such as one single hook in the centre back and two (2) single hooks in the centre of each side panel. Hooks are made with 1/2" x 1/8" rounded end flat bar painted to the locker color. They are securely spot-welded to the body.

P. Ventilation: Ventilation opening shall be 5.8 sq. inch of empty space per door panel

Q. Number Plates: Provide oval shaped brass plates. Form numbers 1/4" inch (- mm) high of block font style with ADA designation, in contrasting color.

R. Exposed ends: 16 gauge box end panels, formed to fit the height and depth of the locker, with a 1" edge dimension. The box panel will also conform to match the sloping tops. Double row box end panels shall have a "Z" reinforcing member. Panels to be installed to conceal all fasteners and painted to match the lockers.

S. Number Plates: Black plastic plates are numbered with white engraved numbers. Each plate is flush-fitted into the door and securely fixed with pop-rivets.

2.4 LOCKS

A. Fabricate lockers to receive the following locking devices, installed on lockers using security-type fasteners:

1. Accessible Lockers Where lockers are to be accessible for the disabled, provide lockers, hooks and locking systems that comply with applicable regulations. .
2. All locks to be digital keypad; Multi-user Type Locks, as manufactured by Master Lock..

2.5 METAL LOCKER FINISH

A. Steel sheets and strips shall be sufficiently clean and flat to avoid any detrimental effect to the appearance and construction of the lockers. The surface is suitably prepared for application of the paint coating.

1. Chemically pretreat metal with a six stage cleaning phosphatizing and metal preparation process. Finish coat shall be baked on at 350 to 400 degrees. Select colors from manufacturer's standard colors.
2. All components shall be finished with a 2mm hybrid epoxy/polyester powder, electrostatically applied to ensure uniform thickness and baked cure.

B. Finishes and proceedings are in accordance with CGSB-1-GP-12 specifications. Average thickness (five (5) readings per surface) of paint dry coating is at least 1 mil dry on all apparent surfaces. It is not less than 0.6 mil dry on all other surfaces. Paint dry coating thickness reading is in accordance with CGSB-1-GP-300 specifications.

C. Paint locker doors two colors as seleceted by the Architect.

D. Paint locker one color as seleceted by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases and embedded anchors are properly sized.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install lockers plumb and square.

C. Place and secure on prepared base.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb (445 N).

E. Bolt adjoining locker units together to provide rigid installation.

F. Install end panels, filler panels, and sloped tops.

G. Install accessories.

H. Replace components that do not operate smoothly.

3.3 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

APPLIANCES AND EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Ice Machine.

B. Laundry appliances.

C. Refrigerator

D. Microwave

E. Range

F. Dishwasher

1.3 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping: Plumbing connections for appliances.

B. Section 26 0583 - Wiring Connections: Electrical connections for appliances.

1.4 REFERENCE STANDARDS

A. UL (DIR) - Online Certifications Directory; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five (5) year manufacturer warranty on refrigeration system of Refrigerator and Ice machine.

C. Provide five year manufacturer warranty on washer and dryer.

D. Provide ten (10) year manufacturer warranty on other items.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.

B. Ice Machine

1. Manufactured by Central Restaurant Products, 7750Georgetown Road, Indianapolis IN 46268
2. Model #: 69K-082 Stainless Steel 110 lbs per day
3. Self contained cuber with storage: angle access slide top, and manual defrost.
4. Air Cooled, Front Breath Design, Digital controls, Self Clean Mode, Water Filter included
   a. Exterior Finish: Stainless steel.

b. Manufacturers:
a) Central Restaurant Products.
b) Substitutions: Section 01 2500 Substitution Procedures.

C. Refrigerator
1. Self contained cuber with storage: bottom-mounted freezer, and twin chill.
a. Capacity: Total minimum storage of 27.8 cubic ft (- cu m); minimum 15 percent freezer capacity.
b. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
c. Features: Include glass shelves, automatic icemaker, and light in freezer compartment.
d. Exterior Finish: Stainless steel, Side by Side upper doors, Bottom freezer
2. Manufacturers:
a. GE Appliances; Model # GFE 28HSK/HMK Stainless Steel: www.geappliances.com.
b) Substitutions: See Section 01 6000 - Product Requirement

D. Range, Type -: Electric, free-standing, with glass-ceramic cooktop.
1. Size: 30 inches (762 mm) wide. Slide in Model
2. Oven: Self-cleaning.
3. Elements: Four (4).
4. Controls: Solid state electronic.
5. Features: Include automatic meat thermometer, storage drawer, oven door window, broiler pan and grid, and oven light.
6. Exterior Finish: Stainless steel.
7. Manufacturers:
a. GE Appliances; Profile Series Convection Model # PHS930SLSS Range: www.geappliances.com.

E. Refrigerator, Type Undercounter: Electric, -.
1. Refrigerator : Model # GCE06GSHSB.
2. Features: Include Front leg leveling, ADA compliant, 5.6 CU FT Capacity ENERGY STAR, .
3. Exterior Finish: Stainelss Steel.
4. Manufacturers:
a. GE Appliances; Compact Refrigerator: www.geappliances.com.

F. Microwave: Over-the-range. Life Skills Room
1. Capacity: 0.7 cubic ft (0.019 cu m).
2. Power: 1000 watts. 1.9 CU. FT. Capacity
3. Features: Include turntable, cooktop light, night light, 2-speed exhaust fan, built-in trim kit, and undercabinet mounting kit. Recessed Glass
4. Exterior Finish: Stainless Steel.
5. Manufacturers:
a. GE Appliances; Model # JVM7195SKSS: www.geappliances.com.
b. Substitutions: See Section 01 6000 - Product Requirements.

G. Microwave, Type Countertop: Cabinet installation include trim kit, 30" deluxe, Teacher Lounge.
1. Model Number: CEB1599SJ SS/EL Stainless Steel
2. Trim Kit: JX9153SJ/EL 29 3/4 Z dimension x 19 1/8"
3. Capacity: 1.5 cu ft. Countertop Convection/Microwave
4. Height: 13 inch (_____ mm).
5. Depth: 16 inch (___ mm).
6. Controls: Front.

7. Voltage: 110V , 1000 amps.
8. Exterior and Interior Finish: Stainless steel.
9. Manufacturers:
    a. GE Appliances; CEB1599SJSS/EL: www.geappliances.com/#sle.

H. Dishwasher, Type Top Door Controls: Undercounter.
1. Controls: Solid state electronic.
2. Wash Levels: Three (3). 600 Series
3. Leveling legs
4. Cycles: Six (6), including normal, rinse and hold, short, china/crystal, and pot and pan.
5. Features: Include rinse aid dispenser, optional no-heat dry, optional water temperature boost, adjustable upper rack, and adjustable lower rack.
6. Finish: Porcelain enameled steel, color as indicated.
7. Manufacturers:
    a. GE Appliances; Model GDT655SSJSS: www.geappliances.com.

2.2 LAUNDRY APPLIANCES

A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated. Compatible Washer and Dryer combination. Side by Side in Lower Level. stackable in Life Skills Room

B. Clothes Washer: Front-loading. Stationary
1. Size: 21.5 LB. SS Cylinder 3.42 CU FT
2. Controls: Solid state electronic.
3. Cycles: Include normal, permanent press, delicate, soak, and automatic soak.
4. Motor Speed: Variable speed induction. .9 HP
5. Electrical Requirements: 120V/60/1, 15 amp breaker
6. Features: Include optional second rinse, bleach dispenser, fabric softener dispenser, self-cleaning lint filter, sound insulation, and end of cycle signal.
7. Finish: Painted steel, color white.
8. Manufacturers:
    a. Speed Queen. Model - LFNE 5 BSP115 TW0 1
    b. Substitutions: See Section 01 6000 - Product Requirements.

C. Clothes Dryer: Electric, stationary.
1. Size: 7 cu.ft. 220 CFM
2. Controls: Solid state electronic, with electronic moisture-sensing dry control.
3. Electrical Requirements: 120/240 60 1-30AMP, 30 amp breaker
4. Temperature Selections: Four.
5. Cycles: Include normal, permanent press, knit/delicate, and air only.
6. Features: Include interior light, reversible door, stationary rack, sound insulation, and end of cycle signal.
7. Finish: Painted steel, color as indicated.
8. Manufacturers:
    a. Speed Queen. Model LDEE5 BGS17 3TWO1 Electric
    b. Substitutions: See Section 01 6000 - Product Requirements.

D. Clothes Washer Dryer - Stackable Unit - Speed Queen Model #. ATEE9ASP175TW01 Electric - Life Skills Room
1. Size: 3.4 cu ft Washer - 7.0 cu ft Dryer
2. Front Controls location
3. Tub Materials - Stainless Steel Tubs

4. Exhaust - Include directional exhaust kit 528P3
5. Size - 26-7/8"wide x 78-1/8" high x 27-3/4" deep add depth for hose 31-3/8"
    a. Speed Queen SF7000WE Product Code

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

B. Level all units

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All built in units to be coordinated with cabinetry. Provide all mounting hardware as required.

C. Anchor built-in equipment in place.

3.3 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.4 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION

PROJECTION SCREENS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Front projection screen assemblies.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking in walls and ceilings.

B. Section 09 5100 - Acoustical Ceilings: Suspended panel ceilings for recessed screens.

C. Section 26 0583 - Wiring Connections: Electrical supply, conduit, and wiring for electric motor operated projection screens.

1.4 REFERENCES

A. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

B. Cradle to Cradle Certified - Cradle to Cradle Products Innovation Institute.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: For installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.

D. Samples: For screen fabrics, submit two samples 6 x 6 inch (152 x 152 mm) in size.

E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Experienced in manufacturing products with minimum of ten (10) years experience in the fabrication of projection screen specified in this section.

B. Installer Qualifications: Experienced in installation of the work of this section with minimum of five (5) years .

C. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements and manufacturer’s instructions. Comply with Section 01 3000 - Administrative Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver projection screens to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F (10 degrees C), and stack in accordance with manufacturer's recommendations.

C. Acclimate screens to building temperatures for 24 hours prior to installation, in accordance with manufacturer's recommendations.

1.8 FIELD CONDITIONS

A. Maintain interior of building between 60 degrees F (15 degrees C) and __ degrees F (__ degrees C) during and after installation of projection screens.

1.9 COORDINATION

A. Coordinate work with installation of stage curtains and rigging, electric service power characteristics, and location.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide two (2) year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Da-Lite Screen Company; Contact: P.O. Box 137, 3100 N. Detroit St., Warsaw, IN 46581-0137; Telephone: (800) 622-3737, (574) 267-8101; Fax: (877) 325-4832, (574) 267-7804; E-mail: info@da-lite.com; website: www.da-lite.com

2.2 FRONT PROJECTION SCREENS

A. Front Projection Screens: Factory assembled unless otherwise indicated.
   1. In Classrooms: Motorized, matte light diffusing fabric screen, horizontally tensioned, ceiling recessed.
      a. Screen Viewing Area: 87" x 139".

B. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
   1. Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
   2. Seams: No seams permitted in fabric up to 96 inch (2438 mm) high by 72 inch (1829 mm) wide.

C. Masking Borders: Black, on four sides.

D.

E. Exposed Screen Cases: Steel, with integral roller brackets.
   1. Finish: Baked enamel.
   2. Color: White.
   3. End Caps: Steel; finished to match case.

F. Concealed-in-Ceiling Screen Cases: Steel, with integral roller brackets.
   1. Door Slat: Self trim; self-closing and -opening.
   2. Case Finish: Baked enamel.
   3. Case Color: White.
   4. End Caps: Steel; finished to match case.
   5. Electrically-Operated Screens: 1-1/2 inch (38 mm) aluminum door roller.

G. Electrically-Operated Screens:
   1. Paragon/Series V: Large electrically operated, tab tensioned, extruded aluminum case. Projection screen with motor in roller. Case fully enclosed except for slot allowing viewing surface passage. Roller: 6 inches (152 mm) diameter steel tube. Viewing surface securely attached to roller at top and at bottom to weighted dowel. Provided with universal mounting brackets for attachments to structure above.
   2. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
   3. Motor Screen Controls, UL certified.

a. Key operated 3-position control switch rated 115V AC, 60 Hz to stop or reverse screen at any point.

4. Projection Viewing Surface:
   a. Matt White XT1000V - On Axis gain of 1.0. 180 degree viewing cone. GREENGUARD Children and Schools certified.
   b. Tab-Tensioning System.
      a) Viewing surface with integrated tabs and cable on each side of fabric to provide tension and ensure flat viewing surface. Viewing surface and tabs CNC cut as a single piece. Tabs RF welded to the back of viewing surface to prevent tab separation. Tab adhesives are not acceptable. Warranted for 5 years against tab separation. Viewing surface inserted into aluminum bottom dowel.
   c. Provide an extra screen drop with an overall screen drop of two feet with a black masking top border.
5. Roller: Steel, 2 inch (51 mm) in diameter, with locking device.
6. Vertical Tensioning: Screen fabric weighted at bottom with steel bar and plastic end caps.

2.3 ELECTRICAL COMPONENTS

A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Motors: Direct drive, 110 V, 60 Hz.
   1. Door, Adjustable Masking, and _____ Motor: Mounted inside roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.
      a. Electrical Characteristics: 1.2 amps.

C. Controls: Three (3) position control switch with plate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate is finished and ready to accept screen installation.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo P.C. of unsatisfactory preparation before proceeding.

C. Verify that openings for recessed screens are correctly sized.

D. Verify type and location of electrical connections.

E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.2 PREPARATION

A. Coordinate screen installation with installation of projection systems.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.

B. Do not field cut screens.

C. Install screens in mountings as specified and as indicated on drawings.

D. Install plumb and level.

E. Install electrically operated screens ready for connection to power and control systems by others.

F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.

G. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Have manufacturer's technical representative schedule site visits to review work as follows:
   1. 2 times during progress of work at 25% and completion.
   2. Upon completion of work, after cleaning is carried out.

B. Testing and Inspection: Operate each screen [3] times to ensure viewing surfaces extend and retract through full range of motion.
   1. Verify controls, limit switches, [automatic doors] and other components function as designed and meet project requirements.
   2. Ensure viewing surface raising operation fully engages and lifts screen closure door into closed position.
   3. Adjust motors, controls and components to allow for smooth, unobstructed screen operation

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

STAGE EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Theater and stage equipment including the following:
   1. Stage platforms.

1.2 RELATED SECTIONS

A. Section 01 35 00 - Special Procedures.

B. Section 05 50 00 - Metal Fabrications.

C. Section 06 10 00 - Rough Carpentry.

D. Section 09 22 16.13 - Non-Structural Metal Stud Framing.

E. Division 16 - Electrical for power wiring.

1.3 REFERENCES

A. American Hardboard Association (AHA):
   1. AHA A135.4-95: Basic Hardboard.

B. American Plywood Association (APA).
   1. Performance Standards and Policies for Structural Use Panels.

C. American Society of Civil Engineers (ASCE):
   1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. Architectural Woodwork Institute (AWI):
   1. Quality Manual, 8th Edition.

E. ASTM International (ASTM):
   1. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
   2. ASTM A 500 -Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   3. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
   4. ASTM A1011 - 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.
   5. ASTM B85 - Standard Specification for Aluminum Alloy Die Castings.
   6. ASTM B209 - Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   7. ASTM B221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   8. ASTM B429 - Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
   9. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   10. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   11. ASTM E 413 - Classification for Rating Sound Transmission.

F. International Building Code (IBC).

G. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual for Architectural and Metal Products.

H. National Electrical Manufacturers Association (NEMA): NEMA LD 3-2000 - High Pressure Decorative Laminates.

I. U.S. Department of Commerce, National Institute of Standards and Technology: DOC PS 1: U.S. Product Standard for Construction and Industrial Plywood.

J. US Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEED).

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Provide test results by certified independent testing laboratory indicating compliance with performance requirements.
   2. Rated capacities, construction details, material descriptions, dimensions of individual components, profiles, and finishes.
   3. Delivery, storage, handling, and installation instructions and recommendations.
   4. Maintenance instructions and recommendations.

C. LEED Submittals:
   1. Manufacturer's certificate indicating that composite wood products and adhesives contain no added urea formaldehyde.
   2. Manufacturer's certificate indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating costs for each product having recycled content.
   3. Credit EQ 4.4: Manufacturer's Signed Confirmation indicating that composite wood products and adhesives used in acoustical shells contain no urea formaldehyde.

D. Shop Drawings:
   1. Submit component and project specific installation drawings, cut sheets, and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation. Submit for approval before beginning any fabrication, installation, or erection.
   2. A copy of the Bill of Material shall be included with the submission for approval.
   3. Include fabrication and installation details. Distinguish between factory and field work.
   4. Include plans, elevations, sections, attachments and work by other trades.
   5. Include wiring diagrams when applicable.
   6. Indicate seismic bracing and fastening requirements as applicable.

E. Product Schedule:
   1. Use designations indicated on the Drawings.
   2. Include room locations, dimensions, accessories, finishes, and project specific notes.

F. Verification Samples:
   1. Exposed Finishes and Finish Materials: Not less than 4 by 4 inches (102 by 102 mm), for each type, color, pattern, surface and material selected.
   2. Curtain Materials: Not less than 12 by 12 inches (305 by 305 mm).

G. Closeout Submittals:
   1. Operation and Maintenance Data: For adjusting, repairing and replacing components and accessories.
   2. Warranty: Submit manufacturer's warranty.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain all products from a single manufacturer through one source providing a comprehensive material and installation package:

B. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of similar products in use in similar environments, including project size, and complexity, and with the production capacity to meet the construction and installation schedule.

C. Installer Qualifications: Experienced in installation of the work of this section and acceptable to the manufacturer.

D. Electrical Components: Listed and labeled per NFPA 70, Article 100 by a testing agency acceptable to authorities having jurisdiction.

E. Regulatory Requirements: Where components are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

F. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and installation workmanship.
   1. Finish areas designated by Architect including shims, sealants, and accessories.
   2. Provide full size units, if accepted, units may remain as part of the completed work.
   3. Do not proceed with remaining work until workmanship is approved by Architect.
   4. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened containers with manufacturer's labels attached. Do not deliver material until spaces to receive them are clean, dry, and ready for their installation. Ship to jobsite only after roughing-in, painting and other finishing work has been completed, installation areas are ready to accept work.

B. Handle and install materials to avoid damage.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install materials until spaces are enclosed and weather tight, wet work in spaces is complete and dry, HVAC system is operating and maintaining ambient temperature at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wenger Corporation, JR Clancy and GearBoss, which is located at: ; Owatonna, MN/Syracuse, NY, ; Toll Free Tel: (800) 4WENGER (493-6437); Tel: (507) 455-4100; Fax: (507) 455-4258; Email: request info (info@wengercorp.com)

B. Requests for substitutions shall be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
   1. Manufacturers seeking approval shall submit the following:
      a. Product data, including third-party certified acoustical data and proposed layout for this project.
      b. Project references: Minimum of 5 installations not less than 3 years old, with owner contact information.
      c. Sample warranty.
   2. Submit substitution request not less than required days prior to bid date.
   3. Approval shall be indicated by issuance of written Addendum.
   4. Approved manufacturers shall meet separate requirements of Submittals Article.

2.2 STAGE PLATFORMS

A. Basis of Design: StageTek Platforms; portable stage platforms and seated risers as manufactured by Wenger Corporation.

B. Structural Performance Requirements:

1. Stage Platforms and Risers: Standard Uniform Load 4 feet by 8 feet (1219 mm by 2438 mm) Deck: 125 lbf/ft. 2 (6 kN/ m2). Heavy-Duty Uniform Load 4 feet by 8 feet (1219 mm by 2438 mm) Deck with additional 5th leg: 200 lbf/ft. 2 (9.6 kN m2).
2. Stage Platforms and Risers: Dynamic Live Load: Side load of 15% of total Uniform Live Load: 600lb (2.7 kN) side load on a 4 feet by 8 feet (1219 mm by 2438 mm) platform under a total Uniform Live Load of 4,000 lbs (17.8 kN).
3. Stage Platforms and Risers: Point Load: 1,500lb (6.7 kN) applied via 1 inch (2.5 cm) diameter pin.
4. Stage Platforms and Risers: Fully replaceable components including corners, frame and wood deck. Replaceable in the field with common tools.
5. Treads of Stairs: Uniform Load: 500 lbs (227 Kg) per 36 inches x 11 inches tread. (91.44 cm X 27.94 cm), and concentrated load: 300 lbs (136 Kg) on area of 12 sq. in. (77.4 sq. cm): Total Uniform Load of 1,000 lbs (454 Kg) per stair assembly.
6. Guard Rail Concentrated Load: 200 lbf (0.89 kN) applied at any point in any direction.
7. Guard Rail Uniform Load: 50 lbf/ft. (0.73 kN/m) applied to top rail.
8. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 lbf (0.22 kN) applied to 1 sq. ft. (0.093 sq. m) area.
9. Guard Rail In-Fill Panel compliant with IBC 4 inches (102 mm) sphere code.

C. Materials:
   1. Aluminum: Complies with ASTM Standards listed above in section 1.3 C
   2. Materials Meeting sustainable Design Requirements:
      a. Provide stage platforms and risers made with products and adhesives that contain no urea formaldehyde.
   3. Softwood Plywood: DOC APA PS1.
   4. Hardboard: AHA A135.4, Tempered Grade.
   5. Hardware and Fasteners: Manufacturer's standard non-corroding type, permanently mounted to units, remaining set or tightened under load and vibration in service, and designed to preclude user contact with sharp edges.

D. Frame: Extruded 6063-T6 aluminum, 4 inches tall (102 mm), with hidden contours to accept attachments. Rounded 1.5 inches (38 mm) hand-hold area open to accept power-grip (closed-grip) around entire perimeter. Frame components are repairable and replaceable.

E. Corners: Cast 380 aluminum corner assembly engages leg 3 inches (76.2 mm) and secures leg with a full-length 2.75 inches (69.85 mm) convex brace driven by a threaded bolt operated with a nylon t-handle. Corner assemblies are repairable and replaceable.

F. Legs: Legs operate individually and are constructed of extruded 6063-T6 aluminum round tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .075 inch (1.905 mm). Standard fixed-height legs available in 8, 16, 24, 32, and 40 inches (200, 410, 610, 810, and 1020 mm) high, as required for layout indicated. Non-marking cap. Legs to store resting on frame rails or in clamping brackets within deck frames.
   1. Fixed Height Legs: Provide where indicated. Legs constructed of extruded 6063-T6 aluminum round tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .075 inch (1.905 mm). Standard fixed-height legs available in 8, 16, 24, 32, 40, and 48 inches (200, 410, 610, 810, 1020 and 1220 mm) high, as required for layout indicated. Non-marking cap. Legs to store resting on frame rails or in clamping brackets within deck frames.
   2. Adjustable Legs: Provided where indicated. Constructed of extruded 6063-T6 aluminum tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .0750 inch (1.905 mm) with an adjustable threaded foot for infinite adjustability plus or minus 2 inches (51 mm) from nominal length of leg. The foot shall provide a non-marking rubber pad.

G. Deck Panels: Manufacturer's standard panel construction, 3/4-inch (19-mm) overall thickness, consisting of minimum 1/2-inch (12-mm) thick plywood substrate with finish surfaces consisting of, edged with extruded aluminum:
   1. Finish: 1/8 inch (3 mm) tempered hardboard, with painted top surface.
   2. Panel Dimensions: Manufacturer's standard sizes, as required for layout indicated.

H. Ramps: Complying with performance and accessibility requirements including 2015 IBC Section 1012, adjustable to meet platform height, portable and compatible with platform panel storage cart.

I. Closure Panels: Closure panels matching Standard textured horizontal surface, not less than 3/4 inch (19 mm) thick plywood, secured with tool-free snap attachment located as follows:
   1. Front of unit.
   2. Sides of unit.
   3. Intermediate risers.

J. Metal Finishes: Aluminum: Mill finish.

K. Opaque Finish for Hardboard: 100 percent acrylic paint, specially formulated for adhesion to impermeable surfaces, 1-coat, satin finish, black.

L. Fabrication: Provide portable stages and risers meeting performance requirements, with the following characteristics:
   1. Portable and sortable in space indicated.
   2. Easily set up and disassembled without use of special tools or loose fasteners.
   3. Modular and reconfigurable.
   4. Platform components replaceable with common tools to include corners, frame sections, and platform decking.
   5. Platforms supported by individual legs that are sortable inside the platform frame.
   6. Platforms designed for comfortable and secure power-grip (closed-grip) anywhere around entire deck perimeter.
   7. Lightweight leg sets/understructures - 40 inches (101 cm) tall or shorter weigh less than 10 lbs (4.5 kg).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine installation areas and mounting surfaces with Installer present, for compliance with manufacturer's installation tolerances including required clearances, floor level, location of blocking and anchoring reinforcements, and other existing conditions that may affect installation or performance.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Proceed with installation only after correction of unsatisfactory conditions.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION - GENERAL

A. Install manufactured units in accordance with manufacturer's recommendations, approved submittals, and in proper relationship with adjacent construction.

3.4 INSTALLATION OF THEATER AND STAGE EQUIPMENT

A. Install manufactured units in location indicated to verify components are complete and operational. Adjust equipment until satisfactory results are achieved.

B. Acoustical Cloud Installation: Install auditorium acoustical cloud units plumb, level, and true, in accordance with manufacturer's recommendations and approved submittals. Suspend from overhead structure using specified installation accessories. Clean exposed surfaces of acoustical clouds. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

3.5 CLEANING AND PROTECTION

A. Repair or replace defective work as directed by Architect upon inspection.

B. Clean surfaces. Touch up marred finishes, or replace damaged components that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by manufacturer.

C. Protect installed products from damage, abuse, dust, dirt, stain, or paint until completion of project. Do not permit use during construction.

END OF SECTION

GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Basketball backboards, goals, and support framing.

B. Wall mounted protection pads for wall, columns and steel bracing.

C. Gym Scoreboard and 24 second clock.

D. Control console and carrying case.

E. Center Roll Divider curtains.

F. Volleyball nets and posts.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete floor slab to receive floor sleeves and anchors.

B. Section 05 1200 - Structural Steel Framing: Structural members supporting basketball systems.

C. Section 05 5000 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.

D. Section 09 6429 - Wood Strip and Plank Flooring: Gymnasium flooring.

E. Section 26 0300 Wire and Cabling.

1.4 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

B. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 101 - Life Safety Code; 2017.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:

1. Electrical characteristics and connection locations.
2. Manufacturer's installation instructions.

C. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gage of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.

D. Erection Drawings: Detailed dimensional requirements for proper location of equipment.

E. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors.

F. Operating and maintenance data, for each operating equipment item.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten (10) years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. See drawings for sizes and locations, unless noted otherwise.

B. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of contract documents.

C. Hardware: Heavy duty steel hardware, as recommended by manufacturer.

D. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.

E. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.2 DIVIDER CURTAINS

A. Gymnasium Divider Curtains:
   1. Curtain Material: ASTM E-84Class A rated, self-extinguishing vinyl coated polyester meeting NFPA 101.
      a. Upper Section: 8 oz/sq yd. vinyl mesh fabric.
         a) Open polyester type interlocking grid weave coated with polyvinyl chloride with an approximate 45 to 50% open area.
         b) Start mesh at a standard height of 8'-0" above the floor.
         c) Color: As selected by the Architect..
      b. Lower Section: 19 oz/sq yd solid vinyl coated polyester.
         a) Antibacterial, fungi-resistant and flame-retardant.
         b) Padded bottom tube.
         c) Color: As selected by the Architect..
   2. Top and bottom of curtain shall be fabricated with a pocket to conceal a continuous 1-5/16" O.D. steel tube extending the full length of the fabric to ensure proper support fitting to provide proper horizontal alignment with floor.
      a. Tube shall be supported from roller support assemblies on adjustable chains not exceeding 14'-0" centers. See drawings for structural supports.
   3. The bottom edge of the upper section and the top edge of the lower section shall be hemmed and contain a 3/16" (4.75mm) diameter cable to fit and hold the curtain sections in a 3" OD (76mm) grooved center drive anodized aluminum batten tube
   4. Motors 3/4 HP (115 volt, 3.8 amp each, single-phase), gear reducer, brake mechanism concealed inside the horizontal batten tube.

a. Automatic overload protection manufactured to NEMA specifications.

5. Operation: Vertical lift roll-up, curtain coils on top rail.
6. Controls: Wall Key switch.
   a. Two (2) key-operated, tamper-proof, constant pressure control stations that are wired in series, remotely located at opposite ends and opposite sides of, and in view of, the partition, and which are designed and constructed so as to require simultaneous activation of both control stations to operate the partition.
   b. Reversed at any point in the travel cycle.
   c. Provide conspicuous signage regarding the safe and proper operation and supervision of the electrical device operating the curtain shall be posted in the immediate vicinity of each operating mechanism, on both sides of the separation and adjacent to the operating mechanism.
   d. Provide two (2) Shaft Safety Locks near each output on the electric operator.
7. Curtain Size: A shown on drawings.
8. Manufacturers:
   a. Porter 92085000 . Roll Up, Motorized. porter@porterathletic.com
   b. Substitutions: Section 01 2500 Substitution Procedures.

2.3 BASKETBALL

A. Basketball System: Backstop assembly, backboard, goal and netting.

B. Ceiling-Suspended Backstop Assemblies: Capable of mounting both rectangular and fan-shaped backboards.
   1. Framing: Center strut; backward folding framing.
   2. Framing: Center strut; forward folding framing.
   3. Folding Control System: Electric hoist that folds backstop with 115 volt actuator, integral limit switches that provide automatic shut-off in both positions, and safety catch with automatic reset.
      a. Porter #00707-000, 3/4 HP Electric winch.
   4. Height Adjuster: To raise/lower assembly by 2 feet (610 mm) to adjust goal height.
   5. Height Control System: Electric hoist that adjusts backstop with 115 volt actuator, and integral limit switches that provide automatic shut-off in both positions.
      a. Electric, Key Switch Porter B-901-505
   6. Framing Color: As selected from manufacturer's standard selection.
   7. Warranty: Twenty five (25) years.
   8. Product: Model 90949000, 3/4 HP, Ceiling suspended, Backward and Forward Fold Electric. manufactured by Porter Athletic..

C. Backboards: Tempered glass, rectangular shaped.
   1. Frame: Brushed aluminum edge, steel mounting.
   2. Conform to NCAA, NFHS and professional requirements.
   3. Unitized construction fabricated from heavy wall rectangular steel tubing, aluminum-faced'
      a. Vertical center strut with a unique spacer sleeve arrangement at the upper two goal the glass to transmit undue loading during slam-dunks, etc. directly through the glass and into the rear frame
   4. Dimensions: 42 inches (- mm) high by 72 inches (- mm) wide
   5. Thickness: 1/2" fully tempered (heat-treated) glass section with uniform load and impact strength.
      a. Official white border and target area is "fired in" permanently on front.
      b. Shock absorbing neoprene material to cushion shock absorbing neoprene material to cushion and protect the glass section.
      c. Goal mounting holes (4) to be on standard 5" (horizontal) x 4-1/2" (vertical) mounting centers

6. Provide safety padding for bottom edge of backboard.
7. Color: Manufacturer's standard.
8. Warranty: Manufacturer's standard Lifetime warranty
9. Product: Model 00204000, backboard, manufactured by Porter Athletic Co..

D. Goals: Steel rim, mounted to backboard, complete with universal mounting hardware co-ordinate with backboard. Provide 2 attached nylon anti-whip nets.
1. Net Attachment Device: "No Tie" net clips.
2. Breakaway mechanism, adjustable.
3. Provide safety pad for goal mounting.
4. Finish: Powder coat orange.
5. Product: Model 00210, rear mounted, goal rim manufactured by Porter Athletic Co..
6. Substitutions: Section 01 2500 Substitution Procedures.

2.4 FLOOR-MOUNTED EQUIPMENT

A. Volley Ball Nets and Posts: One court system of adjustable posts, net, and tensioning winch meeting requirements for FIVB, USA Volleyball, NCAA and NFHS competition requirements.
1. Posts: 3-1/2 inch (89 mm) O.D. schedule 80 aluminum tube with 1 inch (25 mm) height adjustments between 42 and 96 inches (1.07 and 2.4 m).
2. Net: 4 inch (101 mm) square #36 nylon cord with vinyl coated polyester hem, double stitched around the perimeter.
a. Top Hem Reinforcing: 2000 pound (907 kg) minimum break strength galvanized aircraft cable in nylon coating.
a) Net cable: 1/8 inch diameter, 2000 pounds minimum breaking strength, galvanized aircraft cable with nylon coating. Equip ends with loops formed with heavy swaged type fittings. Run cable through top hem
b. Bottom Hem Reinforcing: 1/4 inch (6.3 mm) diameter braided nylon rope with spring loaded, pressure type rope tensioner.
3. Tensioning Winch: Manual crank heavy duty, self-locking worm gear mechanism.
a. Position winch on outside of bottom tube.
a) Equip winch with 2 inches wide, high tensile nylon strap with sling ring and spring-hook for connection to net cable
4. Protective Pads: Polyethylene foam covered with polyester reinforced vinyl fabric.
a. Color: Blue or standard color by Architect.

B. Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
1. Latch Cover: Brass, round; tamper resistant lock with key.
2. Sleeve: Aluminum.
3. Depth of Sleeve: 8" from floor surface to bottom, including latch cover.

2.5 SCOREBOARD

A. Manufacturer: Daktronics
1. Product: Basketball, Wrestling , and Volleyball Daktronics BB-2103 with 300 Watts, 2.5 Amps Wireless control scoring console for basketball, volleyball and wrestling. Website: www.daktronics.com, e-mail: sales@daktronics.com

B. Single-sided LED scoreboard displays period time to 99:59, HOME and GUEST scores to 199, PERIOD to nine, PLAYER number to 99, player FOUL to nine, team FOULS to 19 and indicates possession and bonus. T.O.L. (time outs left) to nine are optional. Scoreboard can also score volleyball and wrestling. When period time is less than one minute, the scoreboard displays time to 1/10 of a second. Scoreboard shown with PanaView® digits and optional striping

C. Substitutions: See Section 01 2500 - Substitution Procedures.

D. General information
   1. Dimensions: 6'-0" (1.83 m) high, 8'-0" (2.44 m) wide, 0'-6" (152 mm) deep
   2. Base weight: 180 lb (82 kg) - options may increase weight
   3. Base power requirement: 210 W - options may increase wattage
   4. Color:
      a. Background - Middle Blue
      b. Letters - Light Orange
      c. Edge - Black

E. Construction
   1. All-aluminum construction
   2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
   3. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens

F. Digits & Indicators
   1. LED digit technology
      a. UniView® (UV) - enhanced digits with diffusant lenses over the LEDs that blend the light for a uniform bar look and 140° viewing angle
   2. LED color (SELECT ONE DIGIT COLOR IN BRACKETS ONLY):
      a. Amber clock/colon, PERIOD and PLAYER/FOUL digits and bonus indicators with Red score and FOULS digits and possession indicators.
   3. Clock and score digits: 13" (330 mm) high
   4. PERIOD, FOULS and PLAYER/FOUL digits: 10" (254 mm) high
   5. Bonus indicators: 4" (102 mm) high
   6. Possession arrows: 3" (76 mm) high
   7. Seven bar segments per digit

G. Captions
   1. Vinyl applied directly to scoreboard face
   2. HOME and GUEST captions: 6" (152 mm) high
   3. PERIOD, FOULS/SCORE and PLAYER/FOUL/MATCH captions: 4" (102 mm) high
   4. Color: White.

H. Horn
   1. Vibrating horn mounted inside the scoreboard cabinet behind the face
   2. Sounds automatically when period clock counts down to zero
   3. Sounds manually as directed by operator

I. Power Cord
   1. Cord is 11' (3.35 m) long
   2. Cord plugs into a standard grounded outlet

J. Accessory Equipment
   1. Volleyball and wrestling captions on changeable panels
   2. Advantage time option for wrestling mode - PLAYER and FOUL digits reversed.
   3. Hinged metal mesh protective screen - painted to match scoreboard.

K. Scoring Console
   1. Console is an All Sport® 5000 controller.
   2. Scores multiple sports using changeable keyboard inserts.
   3. Controls multiple scoreboards, stats displays and shot clocks.

4. Recalls clock, score, and period information if power is lost.
5. Runs Time of Day and Segment Timer modes.
6. Console includes:
    a. Rugged aluminum enclosure to house electronics
    b. Sealed membrane water-resistant keyboard
    c. 32-character backlit LCD to verify entries and recall information currently displayed
    d. Power cord that plugs into a standard grounded outlet; 6 watts max.
    e. Hand-held switch for main clock start/stop and horn.
    f. Soft-sided carrying case
7. Accessory Equipment
    a. 2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels; system includes a transmitter installed inside the console and a receiver installed inside the scoreboard(s).
    b. Hard carrying case.
    c. Battery pack.

2.6 SHOT CLOCK:

A. Daktronics BB-2114 single-sided basketball shot clock timer displays shot times up to a value of 99 seconds. It can also count down from any preset time between 0 and 99 seconds. A hand-held start/stop/reset switch is included with purchase.

B. General information
1. Dimensions: 1'-7" (483 mm) high, 1'-10" (559 mm) wide, 0'-6" (152 mm) deep
2. Weight: 15 lb (7 kg)
3. Power requirement: 350 W
4. Color: Semi-gloss black

C. Construction
1. All-aluminum construction
2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
3. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens

D. Digits
1. LED digit technology
    a. UniView® (UV) - enhanced digits with diffusing lenses over the LEDs that blend the light for a uniform bar look and 140° viewing angle
2. Shot clock digits: 13" (330 mm) high
3. Shot clock digits: red LEDs
4. Seven bar segments per digit

E. Horn
1. Internal horn sounds automatically when shot clock counts down to zero
2. Sound is distinctly different from the game-clock horn

F. Accessory Equipment
1. Carrying handle.
2. Portable signal kit.
3. Hinged metal mesh protective screen - painted to match scoreboard.

G. Scoring Console
1. Controller not included with standard purchase; timer will be controlled by the same console controlling the basketball scoreboard(s).

2.7 WALL PADDING

A. Panel shall meet the min. ASTM F2440-04 Standard Specification

B. Entire pad assembly has been tested and meets the requirements of NFPA 101 Life Safety Code for Class A rating (flame spread 0-25, smoke development 0-450) when tested in accordance with ASTM E-84 (also published as NFPA-255, ANSI 2.5, UBC 8-1, and UL 723). Entire pad assembly has been tested and meets the criteria set forth in the 2003 IBC section 803.2.1 when tested in accordance with NFPA 286, NFPA does not publish pass/fail criteria

C. Wall Padding: Foam filling bonded to backing board, wrapped in covering; each panel fabricated in one piece.
   1. Covering: Vinyl-coated polyester fabric, mildew and rot resistant; stapled to back of board.
      a. Cover material shall be designated as flame resistant in accordance with NFPA 701,
      b. Color: As selected from manufacturer's standard range.
      c. Texture: Embossed leather-look.
      d. Height: As shown on drawings.
      e. Fabric Weight: 15 oz/sq yd (45 kg/sq m).
      f. Tear Strength: 100 psi.
      g. Mildew and rot resistant and fortified with an infection combating fungicide
   2. Foam: Open cell polychloroprene (Neoprene) 5.5 pcf (90 kg/cu m) nominal density.
      a. Flame Rating: Class A.
   3. Foam Thickness: 2 inches (50 mm).
   4. Backing Board: Oriented strand board.
      a. Thickness: 7/16 inch (11 mm).
      b. Surface Burning Characteristics: Flame spread index (FSI) of 25 or less, smoke developed index (SDI) of 450 or less, Class A, when tested in accordance with ASTM E84.
   5. Mounting: Removable; Z-clips fixed to wall and to padding.
      a. Model 00347-100 6' lengths.
      b. Model 00347-200 Panel clips, 1'=10" lengths.
   6. Manufacturers:
      a. Porter Athletic."00570 - 1" x 2" SuperSafe Wall Pad (No Nailing Margin) .
      b. Substitutions: 01 2500 Substitution Procedures.

D. Specially Shaped Padding: Same construction as standard padding; custom fabricate to fit irregularly shaped members, areas, and protrusions in gymnasium as indicated; provide padding for:
   1. Molded Inserts:
      a. 343101 for one gang box, Graphite.
      b. 344101 for two gang box., Graphite.
   2. Wall corners.
   3. Steel Column covers.
   4. Steel bracing covers.

E. Steel column and bracing covers: Same construction as standard padding; made to fit; Manufactures standard attachment.

PART 3 EXECUTION

3.1 EXAMINATION

A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.

B. Inspect areas and conditions before installation. Notify Fuller and D'Angelo P.C. in writing of unsatisfactory or detrimental conditions. Do not proceed until conditions have been corrected. Commencing installation constitutes acceptance of work site conditions.

C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

D. Verify that electrical services are correctly located and have proper characteristics.

E. Verify that mounting surface is ready to receive scoreboard. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings.

3.2 INSTALLATION

A. Install in accordance with contract documents and manufacturer's instructions.

B. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.

C. Install equipment rigid, straight, plumb, and level.

D. Secure all equipment with manufacturer's recommended anchoring devices.

E. Install wall padding securely, with edges tight to wall and without wrinkles in fabric covering.

F. Separate dissimilar metals to prevent electrolytic corrosion.

G. Coordinate electrical requirements for motorized operating mechanism to ensure proper power source, conduit, wiring, and boxes for keyed switches. Prior to installation, verify type and location of power supply.

H. Mount scoreboards and interior displays to wall in location detailed and in accordance with manufacturer's instructions. Unit to be plumb and level

3.3 INSTALLATION—CONTROL CENTER

A. Provide boxes, cover plates and jacks as required to meet control specification requirements. Control cables to control panels shall be concealed.

B. Test the operation of the scoreboard, controller and all control jacks; leave control unit in carrying case and other loose items with owner's designated representative.

C. Conduct operator training on the scoreboard/controller operation

3.4 TESTING AND DEMONSTRATION

A. Demonstrate to Owner's designated representatives complete operation and required maintenance.

3.5 ADJUSTING

A. Verify proper placement of equipment.

B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.

C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.6 CLEANING

A. Remove masking or protective covering from finished surfaces.

B. Clean equipment in accordance with manufacturer's recommendations.

3.7 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

END OF SECTION

HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Horizontal slat louver blinds.

B. Operating hardware.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

B. Section 08 4313 - Aluminum-Framed Entrances and Storefront.

C. Section 08 5113 - Aluminum Windows.

D. Section 12 2940 - Roller Shades.

1.4 REFERENCE STANDARDS

A. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the placement of concealed blocking to support blinds. See Section 06 1000.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating physical and dimensional characteristics.

C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.

D. Samples: Submit two samples, 12 x 12 inch (300 x 300 mm) long illustrating slat materials and finish, cord type and color.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Lift Cords, Control Cords, and Wands: Five of each type.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum Five (5) years documented experience.

B. Installer Qualifications: Company specializing in installation of the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Horizontal Louver Blinds:

1. Hunter Douglas Architectural; CD Model: www.hunterdouglasarchitectural.com/#sle.
2. Substitutions: 01 2500 - Substitution Procedures.

2.2 BLINDS

A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.

B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.

C. Metal Slats: Spring tempered pre-finished aluminum; square slat corners, with manufacturing burrs removed.
   1. Width: 1 inch (25 mm).
   2. Thickness: 0.008 inch (0.20 mm).
   3. Color: As selected by Architect.

D. Slat Support: Woven polypropylene cord, ladder configuration.

E. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
   1. Color: Same as slats.

F. Bottom Rail: Pre-finished, formed aluminum; with end caps.
   1. Color: Same as headrail.

G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
   1. Free end weighted.
   2. Color: As selected by Architect.

H. Control Wand: Extruded solid plastic; hexagonal shape.
   1. Removable type.
   2. Length of window opening height less 3 inch (76 mm).
   3. Color: Clear.

I. Headrail Attachment: Wall brackets.

2.3 FABRICATION

A. Determine sizes by field measurement.

B. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch (3 mm).

C. At openings requiring multiple blind units, provide separate blind assemblies with space of 1/4 inch (3 mm) between blinds, located at window mullion centers.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that openings are ready to receive the work.

B. Ensure structural blocking and supports are correctly placed. See Section 06 1000.

3.2 INSTALLATION

A. Install blinds in accordance with manufacturer's instructions.

B. Secure in place with flush countersunk fasteners.

3.3 TOLERANCES

A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch (6 mm).

B. Maximum Offset From Level: 1/8 inch (3 mm).

3.4 ADJUSTING

A. Adjust blinds for smooth operation.

3.5 CLEANING

A. Clean blind surfaces just prior to occupancy.

END OF SECTION

ROLLER SHADES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. For locations see window schedule and drawings.

B. Manual operated bead chain clutch operated roller shades.

C. Room darkening and sunscreen double roller shades.

D. Facia.

E. Accessories.

F. Emergency Rescue Window sticker.

1.3 RELATED SECTIONS

A. Section 06 1000 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 008 5113 - Aluminum Windows.

C. Section 009 2116 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

D. Section 09 5100 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.4 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.

B. Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

1. Prepare shop drawings on AutoCAD format using base sheets provided electronically by the Architect.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

G. Maintenance Materials: Furnish the following for Port Chester-Rye UFSD's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements. For additional provisions.
   2. **Extra Chains: Provide 500 linear feet of #10 qualified stainless steel chain rated to 90 lb.**

1.6 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.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section and approved by the manufacturer. .

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.7 MOCK-UP

A. Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
   1. Locate mock-up in window designated by Construction Manager.
   2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.10 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Standard Shade cloth: Manufacturer's standard twenty-five year.

C. Roller Shade Installation: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: MechoShade Systems, Inc., which is located at: 42-03 35th St., Long Island City, NY 11101; Tel: 718-729-2020; Fax: 718-729-2941; Email: angela.gratereaux@mechoshade.com <mailto:angela.gratereaux@mechoshade.com. Web: www.mechoshade.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 2500 - Substitution Procedures.

2.2 ROLLER SHADE TYPES

A. Manual operating, chain drive, sunscreen roller shades shall be provided at all exterior windows of classrooms and spaces shown on the Drawings. Shades are to be reverse roll unless otherwise noted.

B. Manual Shades

1. Mounting: Surface mounted.
2. Product: Mecho/5 bracket with facia.

2.3 SHADE CLOTH

A. Solar Shade cloths:
   1. Visually Transparent Shade cloth: MechoShade Systems, Inc., ThermoVeil series, single thickness non-raveling 0.030-inch (0.762 mm) thick vinyl fabric, woven from 0.018-inch (0.457 mm) diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl.
   2. Color: 1103 Broome (light grey) 76% PVC 24% Polyestervv
   3. Use for all shades

B. Blackout Shadecloths:
   1. Fabric: ThermoVeil Vertical Privacy Weave 0900 Series (0-1% opening., blackout shadecloth with opaque acrylic backing.
   2. Color: 0907 Beige..
   3. Use in Coral Room 310; Band Room 309 and Mechanical Drafting Classroom 306.

2.4 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
   2. Shade Band and Shade Roller Attachment:
      a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
      b. Provide for positive mechanical engagement with drive / brake mechanism.
      c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
      d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
      e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATI0N

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
   1. Standard concealed hem bar.

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

F. Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.

1. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moire effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.6 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable
7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
    a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
    b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.

c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.

d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.

e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

f. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
2. Fascia shall be able to be installed across two or more shade bands in one piece.
3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
5. Notching of Fascia for manual chain shall not be acceptable.

B. Bead chain Hold Down Device: WCMA approved.

C. Blocking: Provide blocking as shown on drawings including supports and anchoring.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect or School Construction Consultantsof unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PLASTIC LAMINATED CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Provide all plastic laminated casework and accessory items as specified herein. Refer to drawings for specific details, requirements, types and locations.
   1. All casework shall be plastic laminate, unless noted otherwise and shall include but not be limited to the following:
      a. Base cabinets
      b. Wall cabinets.
      c. Tall cabinets.
      d. Wardrobe units
      e. Sink Cabinets.
      f. Handicapped accessible sink/workstations.
      g. Shelf units.
      h. Metal Grilles
      i. Grommets.
      j. Under Counter support panels.
      k. Separate wood bases for laminated cabinets.
      l. Heat Resistant Board behind base cabinets located on exterior walls.
      m. Paper storage cabinets.
      n. Lateral files.
      o. Custom units where indicated.
      p. Locks.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section06 1000 - Rough Carpentry for blocking within walls.

B. Section 09 2116 - Gypsum Board Assemblies.

C. Section 09 6500 - Resilient Flooring. Base molding furnished and installed.

D. Section 11 3013 - Appliances and Equipment.

E. Section 12 3600 - Solid Surfacing Window Sills and Countertops for solid surface countertops.

F. Division 22 for Stainless steel sinks, fittings, traps, stops, tailpieces, vacuum breakers, electrical outlets and other fixtures, etc. Furnished and installed by plumbing contractor.Furnished and installed under Mechanical and Electrical Divisions.

1.4 DEFINITIONS

A. Identification of casework components and related products by surface visibility.
   1. Open Interiors: Any open storage unit without solid door or drawer fronts, units with full glass insert doors and/or acrylic doors, and units with sliding solid doors.
   2. Closed Interiors: Any closed storage unit behind solid doors or drawer fronts.
   3. Exposed Ends: Any storage unit exterior side surface that is visible after installation.
   4. Other Exposed Surfaces: Faces of doors and drawers when closed, and tops of cabinets less than 72 inches above furnished floor.
   5. Semi-Exposed Surfaces: Interior surfaces which are exposed to view when doors or drawers are opened, bottoms of wall cabinets and tops of cabinets 72 inches or more above finished floor.

6. Concealed Surfaces: Any surface not visible after installation

1.5 QUALITY ASSURANCE

A. System Structural Performance: Casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
   1. Support Framing System: 600 lb/ft.
   2. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft
   3. Wall Cabinets (Upper Cabinets): 160 lb/ft.
   4. Shelves: 40 lb/ft .
   5. Delegated Design: Design casework, including comprehensive engineering analysis by a qualified professional engineer, using seismic performance requirements and design criteria indicated.
   6. Seismic Performance: Casework and support framing system or including attachments to other work and shall withstand the effects of earthquake motions determined according to New York State Building Code.

B. Installer Qualifications: A single installer shall perform the work of this section, and shall be a firm with not less than five (5) continuous years of successful experience in the installation of this work, similar to that required for this project and approved by the manufacturer.
   1. The installer shall provide a list of at least five (5) projects of comparable size and similar in design within a fifty mile radius of this project, which may be observed by the representative of the Architect, and or Owner.
   2. Provide laminate clad casework and countertops furnished and installed by the same supplier for single responsibility and integration with other building trades.

C. Manufacturer: Minimum of ten (10) years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
   1. Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.
   2. Single Source Manufacturer: Casework millwork products must all be engineered and built by a single source manufacturer in order to ensure consistency and quality for these related products. Splitting casework and architectural millwork between multiple manufacturers will not be permitted.
   3. Manufacturer shall be member of the Architectural Woodwork Institute and Approved Quality Certification Program.

D. Test data performed and certified by an independent testing agency, covering the following areas of product performance:

1.	Base cabinet construction racking test.	990 lbs.
2.	Cabinet front joint loading test:	650 lbs.
3.	Wall cabinet static load test:	1,850 lbs.
4.	Drawer front joint loading test:	940 lbs.
5.	Drawer construction/static load test:	920 lbs.
6.	Cabinet adjustable shelf support device:	
	a. Static load test:	1150 lbs.
7.	Particleboard screws holding power:	Face: 225 lbs. / Edge: 155 lbs.

E. Casework must conform to design quality of materials, workmanship and function of casework specified and shown on drawings.

F. Design: Door/Drawer overlay cabinet end panels, as reveal overlay design. Door/Drawer and all cabinet body edges to be 3mm PVC as specified herein. Overlay door designs and/or edging other than specified are not acceptable.

G. 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.

H. Preinstallation Conference: Construction Manager shall schedule pre-installation meeting three (3) weeks prior to start of work at project site.

1.6 ADA AMERICANS WITH DISABILITIES ACT REQUIREMENTS:

A. The following special requirements shall be met, where specifically indicated on architectural plans as "ADA" or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:

1. Countertop height: with or without cabinet below not to exceed a height of 34 inches A.F.F. (Above Finished Floor), at a surface depth of 24 inches.
   a. Knee space clearance: to be a minimum 27 inches A.F.F., and 30 inches clear span width.
   b. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.
   c. Wardrobe cabinets: to be furnished with rod/shelf adjustable to 48 inches A.F.F., and a maximum 21 inch shelf depth.
   d. Sink cabinet clearances: in addition to above, upper knee space frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 11 inches, at a point 9 inches A.F.F. and as further described in Volume 56, Section 4.19.
   e. No cabinets shall be install closer than 18” to the pull side of any door. Co-ordinate with electrical drawings for electrical devices.

1.7 SUBMITTALS

A. Comply with Section 01 3000 - Administrative Requirements, unless otherwise indicated

B. Shop Drawings:

1. Submit CAD production shop drawings prepared by manufacturer for laminate clad casework and countertops showing layout, elevations, ends, cross-sections, service run spaces, specific modifications, component connections, anchorage details, location methods, hardware, and installation procedures .
2. Verify all dimensions and conditions in field.
3. Include layout of units with relation to and clearances of surrounding walls, doors, windows, and other building components.
4. Indicate locations of blocking and reinforcements required for installing casework.
5. Coordinate shop drawings with other work involved.

C. Samples: When requested by Architect:

1. Submit 2-2" x 3" samples of casework manufacturer's standard decorative laminate colors, patterns and textures, for exposed and semi-exposed materials for architect's selection. Samples will be reviewed by Architect for color, texture, and pattern only. Compliance with other specified requirements is the exclusive responsibility of the contractor.
2. Submit one full-size sample base cabinet unit with hardware, doors and drawers, without countertop.
3. Submit one full-size sample wall cabinet unit complete with hardware, doors, and adjustable shelves.
4. Acceptable sample units will be used for comparison inspections at the project. []
   a. Notify Construction Manager of their exact locations of incorporated units. If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work.
   b. Remove sample units from the premises when directed by the Construction Manager
5. Plastic-laminate products, 8 by 10 inches, for each type, color, pattern, and surface finish.
6. Corner pieces as follows:

a. Miter joints for standing trim.

7. Component samples: Two sets of samples for each of the following:
   a. Decorative laminate color charts, PVC edgings, and Solid surface countertops.

1.8 PRODUCT HANDLING:

A. Deliver laminate clad casework and countertops only after wet operations in building are completed.

B. Store completed laminate clad casework and countertops in a ventilated place, protected from the weather, with relative humidity range of 25% to 55%.

C. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with a protective covering.

1.9 JOB CONDITIONS:

A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
   1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
   2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.

B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete

1.10 WARRANTY:

A. All materials shall be guaranteed for a period of 5 years from manufacturer's defects and workmanship from date of acceptance.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. For purpose of determining minimum performance and quality standards, this specification is based upon drawings, specifications and manufacturer’s literature from TMI SYSTEMS CORPORATION, 50 South Third Avenue West, Dickinson, North Dakota, 58601, Phone: 800-456-6716, fixed modular and accessories..
   1. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

B. Regardless of manufacturer or model numbers, if indicated, construction shall be in accordance with TMI Systems Corporation and AWI Architectural Woodwork Standards (AWS)s for modular cabinets except where modified by these specifications. Where standard manufacturers' units do not conform to layout and/or dimensions indicated, custom fabricate unit to conform to these specifications unless such non-conformance is specifically approved by the Architect.
   1. Submit proof of ability to provide Certificate of Compliance in AWI, Architectural Woodwork Institute Quality Certification Program .

2.2 MATERIALS:

A. Core Materials:
   1. All core material shall be a blended bio fiber composition with ultra-low formaldehyde resin system. Board shall exceed performance requirements listed below. Testing for conformance to the listed specifications must be done in accordance with procedures described in the American National Standard for Particleboard (ANSI A208.1 2016 section 5.2 Sampling for Acceptance). Board shall comply with formaldehyde emission requirements for Particleboard in CPA-ECC-2011, ANSI A208.1 2016 and CCR 93120.2 (CARB Composite Wood ATCM Phase II) Casework manufacturer shall provide documentation and certification of use within the entire cabinet. No formaldehyde, no exceptions.
   2. Core material shall meet the following average performance requirements: Submit compliance data from the manufacturer prior to fabrication:

a. Density: Minimum 45 lbs.
b. Modulus of Rupture: 1,800 psi.
c. Modulus of Elasticity: 298,000 psi.
d. Average Internal Bond: 80 psi.
e. Screw holding Face: 2 225 lbs.
f. Screw holding Edge: 155 lbs.
g. Thickness Tolerance: 0.003+/- inches.
h. Linear expansion: 0.2%
i. Thickness swell: 5.5%
j. Thickness used are 1/4", 1/2", 3/4" and 1".
k. Plywood: Shall be 9-ply pressure treated hardwood plywood, "A" faced, hardwood veneer.
l. Provide moister resistant core material at sink locations and wet areas:
   a) Meeting ANSI MR10 minimum requirements, adding protection against occasional wetting and high humidity.

B. Decorative Laminates:
1. High Pressure Decorative Laminates (HPDL) shall be as follows:
   a. Horizontal Surfaces:
      a) 107HGS, matte finish, nominal thickness .048.±005 HIGH WEAR as manufactured by Wilsonart Brand Decorative Laminate
      b) 10/HGS – High Pressure Grade .048 ±005 as manufactured by Formica Brand Laminate.
   b. Exposed Casework Surfaces, Including Exposed Interior Surfaces:
      a) 335VGP, matte finish, nominal thickness .028. +0.001-0.004 HIGH WEAR as manufactured by Wilsonart Brand Decorative Laminate.
   c. Thermally Fused Laminate (TFL) meeting, NEMA Test LD 3-2005. (TFM allowed on casework interiors only, as specified below. Utilization of TFL on any exterior casework surfaces, including door and drawer faces and finished ends, will not be permitted.)
   d. All laminate shall be counter balanced with heavy gauge neutral colored backing sheet.
2. Plastic laminate shall comply with the following minimum:

PHYSICAL PROPERTIES

PYSICAL PROPERTIES	LD3 TEST	Type 107	Type 335
Appearance	3.1	No ABC Defects.	No ABC Defects
Light Resistance	3.3	Slight.	Slight
Cleanability	3.4	10.	10.
Stain Resistance	3.4		
Reagents 1 - 10		No Effect.	No Effect.
Reagents 11 - 15		Slight.	Slight.
Boiling Water Resistance	3.5	No Effect.	No Effect.
High Temperature Resistance	3.6	Slight.	No Effect.
Ball Impact Resistance - in	3.8	65	40".
Radiant Heat Resistance - sec	3.10	210 minimum.	200.
Dimensional Change	3.11		
Machine Direction -%		0.3	0.5
Cross Direction - %		0.7	0.8
Wear Resistance - cycles	3.13	400 (min.)	400 (min.)
Formability - inches		N/A	5/16".
Blistering -sec		N/A	45.

Weight:	0.322 psf.	0.186 psf
Fire Rating: ASTM E -84:		
As required by NYS Building Code	Flame spread 50	45.
	Smoke: 45	40.

3. Substitutions: Refer to Section 01 2500 - Substitution Procedures.

C. Laminate Color Selection as indicated on drawings are as selected by the Architect. Final acceptance of colors by other manufacturer(s) even if listed, as "acceptable manufactures" shall be at the sole discretion of the Architect.

D. Edgebanding: 3mm PVC banding, machine applied with waterproof hot melt adhesive with external edges and outside corners of door machine profiled to 1/8" radius for safety.

E. Metal Parts: Countertop support brackets, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder coated in color selected by the Architect.

2.3 CABINET HARDWARE:

A. Hinges:

1. Shall be five knuckle, epoxy powder coated, institutional grade, 2 3/4" overlay type with hospital tip, eased edges for safety, and a full, 270º door swing for easy access Steel shall be minimum .095" thick and have minimum of nine (9) edge and leaf fastenings. Hinges shall pass ANSI-BHMA standard A156.9, Grade 1 requirement for both vertical and horizontal set and sag (pair of hinges will hold minimum of 310 pounds); copy of test result shall be provided upon request. Casework manufacturer shall use nine specifically engineered screws for attachment of hinges; wood screws shall not be permitted. Doors 48" and over in height shall have three (3) hinges per door.
2. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.
3. Color: As selected by the Architect.
4. Provide magnetic door catch with minimum seven (7) pound pull, attached with screws and slotted for adjustment. (Not ADA)

B. Pulls:

1. Door and drawer front pull shall be ABS plastic, semi recessed, designed of molded plastic and a large gripping space, impact resistance, and no sharp edges. Pull design shall be compatible with Americans with Disability Act (ADA), Federal Register Volume 56, No. 144, specifically paragraph 4.27.4. Other pulls may be acceptable pending architect approval.
   a. Color: As selected by the Architect

C. Drawer Slides:

1. Standard use and knee space drawers shall be Accuride 3600 series or equal with epoxy coated steel finish. Slides will have a 150 pound load rating a**t full extension a**nd shall be bottom corner mounted with smooth and quiet nylon rollers, a built-in positive stop both directions, with self closing feature. Slides shall have a lifetime warranty as offered by the slide manufacturer.

D. Adjustable Shelf Supports:

1. Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support has 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support automatically adapts to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure

E. Wardrobe Cabinet: Tall wardrobe cabinet with one on-center vertical divider.

1. Five adjustable shelves.
2. Mirror.

3. Mirror
4. Wardrobe Rod: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
5. Coat Hooks:
   a. Single coat hooks, wall mount - Bright Zinc.
6. Door Locks.

F. Grommets: Mockett, mocket.com; "BRV2" flush mounted, single slot with steel cap.
1. Finish Satin aluminum.

G. Cable/Data Trays: Provide plastic laminate tray where shown on drawings.

H. Metal Grilles: Where metal grilles are indicated for countertops and/or base cabinets to permit thermal heat flow, they shall be as follows:
1. Countertop and Similar Deck Applications: Heavy gauge extruded aluminum construction, bar type, linear design with natural anodized finish. Frame to have a 5/8" perimeter boarder and frame is to have concealed fastenings and reinforcing bands. Exposed screws in top of frame will not be accepted. Core of frame must be removable allowing for cleaning and servicing of fin tubing below and core is to be held in place by spring clips. The core consists of pencil proof design with deflecting bars 1/8" wide and placed on 1/4" centers. Sizes to be as shown on drawings.
   a. Model # AAG-100/B frame as manufactured by Advance Architectural Grills, New Hyde Park, NY; 516-488-0628 approved equal.
2. Base Grill Units: Twelve (12) gauge extruded aluminum construction, Design E, 1/4" wide openings, 1/8" satin finish aluminum, counter-sunk tamperproof screws.
   a. Manufactured by A.J. Manufacturing, Kansas City, MO, or equal.
3. Lengths shall match the length off the baseboard

2.4 LOCKS:

A. Provide for all doors and drawers. Locks shall be cam style with strike. Each lock shall be furnished with two (2) keys.

B. Locks shall be keyed alike for each room and MASTERKEYED. Keying shall be reviewed with Owner and approved in writing by the Owner.

C. Lock for sliding glass/acrylic doors is a ratchet type sliding showcase lock.

D. Chain bolts shall be 3" long, shall have a 18" pull and an angle strike to secure inactive door on cabinets over 72" in height. Elbow catches shall be used on inactive doors-up to and including 72" in height.

2.5 SPECIALTY ITEMS

A. Support Members:
1. Countertop support brackets: 1" Plastic laminate as shown on drawings.

B. Paper Storage Cabinet:
1. Paper storage cabinet with locking double doors with seven equal drawers behind.

2.6 DECORATIVE LAMINATE COUNTERTOPS:

A. Countertops: High-pressure plastic laminate, as specified for horizontal surfaces, bonded to water resistant core material core. Thickness as shown on plans, but not less the 1-1/2".
1. Underside to be properly balanced with heavy gauge backing sheet.
   a. Furnish countertops with 3-mm edge treatment.
   b. Provide tops in as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inch either side of sink cutout.
   c. The Architect shall approve location of all joints.
   d. Where countertop surfaces are at different heights the surface between the tops shall be provided with a vertical plastic laminate closure.

e. Where countertops adjoin unit ventilators the top of the countertops shall be flush with the unit ventilators. Co ordinate with mechanical contractors and with window stool.

f. All countertops shall be mechanically fastened to cabinets.

2.7 SOLID SURFACING COUNTERTOP

A. Refer to Section 12 3600 - Solid Surfacing Window Sills and Countertops.

2.8 REFLECTIVE INSULATION:

A. Where base cabinets are located on exterior walls and in front of fin tube radiation, provide Class A fire rating exterior wall and/or back of cabinet.

1. Thermo-ply composed of high-quality, long fibered specially treated water- and weather-resistant plies. Plies are pressure laminated.
2. Structural Grade: Red
3. Fire Rated : 1 hour in accordance with ASTM E-19
4. Perm Rating: 0.53- 0.63.
5. Thickness: 0.113
6. R value: 4.2
7. Manufacturer: Ludlow Coated Products. www.ludlowcp.com Product: Structural Grade Red.

2.9 FABRICATION

A. Detailed Requirements for Cabinet Construction:

1. Sub-Base: Cabinet Subbase: To be separate and continuous (no cabinet body sides-to-floor), 3/4" water-resistant exterior grade plywood, 4" high, with concealed fastening to cabinet bottom. Ladder-type construction, of front, back and intermediates, to form a secure and level platform to which cabinets attach. Casework with integral sides or sides running to the floor will be rejected.
2. Sub-base at exposed cabinet end panels shall be recessed 1/4 inch (6.4 mm) from face of finished end, for flush installation of finished base material by other trades.

B. Fabricate casework to dimensions, profiles, and details shown.

1. Cabinet Body Construction:
   a. Fabricate casework, countertops and related products to dimensions, profiles, and details shown on shop drawings.
   b. All casework panel components must go through a supplemental sizing process after cutting, producing a panel precisely finished in size and square to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.
   c. Solid sub-top shall be furnished for all base and tall cabinets.
   d. At cabinets over 36 inches wide, bottoms and tops shall be joined by a fixed vertical divider.
   e. Exterior exposed wall cabinet bottoms shall be white thermally fused laminate (TFL) on both sides. Assembly devices shall be concealed on bottom side of wall cabinets
   f. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals. Minimum 6 dowels each joint for 24 inch deep cabinets and a minimum of 4 dowels each joint for 12 inch deep cabinets. (Mechanical or metal hardware fasteners joining cabinet top and bottom panels to the sides will not be accepted.)
      a) Tops, bottoms and sides of all cabinets are particleboard core
   g. Unless specifically indicated, core shall be 3/4" thick particleboard. Edging and surface finishes as indicated herein.
   h. Cabinet backs: 1/4 inch thick medium density fiberboard panel fully captured by the cabinet top, bottom and side panels. Finish to match cabinet interior. 3/4 inch x 4 inch particleboard rails will be placed behind the back panel at the top and bottom, and doweled to the sides utilizing 10mm hardwood fluted dowels. A third intermediate rail will be

included on all cabinets taller than 56 inches. Utilize hot melt glue to further secure back and increase overall strength

a) Exposed back on fixed or movable cabinets to be 3/4" particleboard, color matched to cabinet interior, exterior surface GP28 laminate as selected.

b) Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.

i. Base units, except sink base units: Full sub-top glued and doweled to cabinet sides. (Mechanical or metal hardware fasteners joining cabinet sub-top panel to the sides will not be accepted.)

a) Sink base units are provided with open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.

j. All end panels and vertical dividers, except sink base units, shall be prepared to receive adjustable shelf hardware at 32mm (approximately 1-1/4") centers. Door hinges, drawer slides and pull-out shelves shall mount on line boring to maintain vertical alignment of components and provide for future relocation of doors, drawers, shelves and/or pull-out shelves.

k. All exposed and semi exposed edges of basic cabinet components shall be factory edged with 3 mm PVC banding, machine applied with waterproof hot melt adhesive. Color as selected by the Architect.

l. Adjustable Shelves in Cabinets

a) Core: Particleboard.

b) Core Thickness: 3/4 inch up to 30 inches wide, 1 inch over 30 inches wide.

c) Edge: 3mm PVC on Front Edge Only

m. Interior finish, units with open Interiors:

a) Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with Thermally Fused Laminate (TFL).

n. Interior finish, units with closed Interiors:

a) Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with Thermally Fused Laminate (TFL).

o. Exposed ends:

a) Faced with high-pressure decorative VGS laminate. Use of TFM on exposed ends will not be permitted.

p. Wall and Tall Unit Tops: (when visible from above):

a) The top edge of all wall and tall unit end panels shall be factory edged with 3mm PVC to match basic cabinet body color; raw edges at top of wall and tall end panels will not be permitted.

b) Top surface will be laminated with melamine in color as selected by the Architect.

q. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), will not be permitted. No exceptions.

C. Drawers:

1. Sides, back and sub front shall be particleboard, 1/2" thick, laminated with TFL in dove gray, frosty white or light beige to match basic cabinet body color. The back and sub front are doweled and glued into the sides. Dowels shall be fluted, with chamfered ends and a minimum diameter of 8 mm. Top edges is banded with 3 mm PVC edging in a matching color.

a. Drawer bottom shall be particleboard, 1/2" thick, laminated with TFL in color to match basic cabinet body color, screwed directly to the bottom edges of the drawer box. Drawer bottom less than 1/2" thick will not be permitted.

b. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with Thermally Fused Laminate (TFL).. Minimum 1/2 inch thick particleboard

drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer

c. Painted finishes on drawer sides and/or bottom will not be permitted.

D. Door/Drawer Fronts:

1. Laminated door and drawer fronts shall be 13/16 inch (20.6 mm) finished thickness for all hinged and sliding doors. Drawer fronts and hinged doors shall to set flush between cabinet end panels, flush inset design the cabinet body. Maintain a maximum 1/8 inch (3.2 mm) reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
2. Double doors shall be used on all cabinets in excess of 24" wide.
3. Exterior faces shall be laminated with high pressure decorative laminate specified, color as selected. Interior face shall be high balanced with pressure cabinet liner CL20.
4. All edges shall be finished with 3mm PVC available in color as selected by the Architect. External edges and outside corners shall be machine profiled to 1/8” radius.

2.10 ACCESS PANELS:

A. Provide removal full width, back panels and closure panels with tamper proof screws cam lock for access to heating and/or plumbing valves, traps, etc. as required. Coordinate with mechanical/electrical drawings and prime contracts.

PART 3 - EXECUTION

3.1 INSPECTION:

A. The installer must examine the jobsite and the conditions under which the work under this section is to be performed, and notify the contractor in writing of unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION:

A. Condition laminate clad casework to average prevailing humidity conditions in installation areas prior to installing.

3.3 COORDINATION:

A. Verify site dimensions of cabinet locations in building prior to fabrication.

B. Coordinate layout and installation of framing and reinforcements for support of casework, and equipment furnished by others and installed in casework..

C. Coordinate installation of roughing with other prime contractors.

D. Coordinate layout and installation of framing and reinforcements for support of casework.

E. Coordinate installation of casework with installation of other casework equipments and accessories

3.4 INSTALLATION OF CABINETS

A. Install all base cabinets on a separate wood base.

B. Install insulation to rear of cabinets as detailed.

C. Install level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:

1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet.
3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.

6. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
   a. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than 2 fasteners per side.
7. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches o.c.
8. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
9. Adjust casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

D. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.

E. All fasteners shall be approved by the architect and provide with screw caps or approved washers. Gypsum board screws are not permitted.

3.5 INSTALLATION OF COUNTERTOPS

A. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
   1. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Prepare edges in shop for field-made joints.
      a. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.
   2. Fastening:
      a. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
      b. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
         a) Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
   3. Provide required holes and cutouts for service fittings.
      a. Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.
      b. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
      c. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.6 PROTECTION

A. Storage and Protection: Casework shall be protected in storage. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Store off the floor to prevent chipping of laminate. Do not store or install casework in building until concrete, masonry or other wet trades are dry.

3.7 ADJUSTING

A. Repair or remove and replace defective work, as directed by (Architect/Owner) upon completion of installation.

B. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly.

3.8 CLEANING AND PROTECTION:

A. Repair or remove and replace defective work as directed upon completion of installation.

1. Clean plastic surfaces, repair minor damage per plastic laminate manufacturer's recommendations. Replace other damaged parts or units.
2. Remove all cartons, debris, sawdust, scraps, etc. and leave space ready for final cleaning.
3. Protect all casework and tops from damage by other trades until acceptance of the work by the Owner.

END OF SECTION

WOOD LABORATORY CASEWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Wood laboratory casework.

B. Laboratory casework system that includes support and utility-space framing and filler and closure panels.

C. Tables.

D. Wall cabinets.

E. Base cabinets.

F. Tall cabinets.

G. Teacher's wardrobe cabinet.

H. File cabinets.

I. Teacher's demonstration table.

J. Eye Wash.

K. Countertops.

L. Laboratory sinks drain outlets, including traps.

M. Pegboards.

N. Service Fittings and Outlets: Water.

O. Grills.

P. Base Grill Units.

Q. Heat Resistant Board behind base cabinets

R. Installation of all items specified herein, including sinks.

1. Service fittings, water shall be installed by the casework contractor.
2. Final connection shall be made by the respective mechanical, plumbing and electrical contractor.

1.3 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: Requirements for sustainably harvested wood.

B. Section 06 1000 - Rough Carpentry: Blocking and nailers for anchoring casework.

C. Section 07 9200 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.

D. Section 09 2116 - Gypsum Board Assemblies: Reinforcements in metal-framed partitions for anchoring casework.

E. Section 09 6500 - Resilient Flooring: Resilient wall base.

F. Section 11450 Residential Equipment for appliances installed within laboratory casework

G. Section 12 3600 - Solid Surfacing Window Sills and Countertops: Additional requirements for countertops.

H. Divisions 22 and 26 for installing service fittings or connecting service fittings.

1.4 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. Exposed: Portions of casework visible when drawers and cabinet doors are closed:
   1. End panels, bottoms of cases more than 42 inches (1.066 m) above finished floor, tops of cases less than 72 inches (1.82 m) above finished floor and all members visible in open cases or behind glass doors.
   2. Surfaces visible when drawers and solid doors are closed.
   3. Surfaces visible behind clear glass doors.
   4. Interior surfaces of open units.
   5. Bottoms of cabinets 42” or more above finished floor.
   6. Tops of cabinets less than 78” above finished floor, or are visible from an upper floor or staircase after installation.
   7. Front edges of cabinet body members visible though a gap greater than 1/8" with doors and
      a. drawers closed.
   8. Surfaces visible when fixed appliances are installed.

C. Ends of cabinets, including those installed directly against walls or other cabinets, are defined as "exposed."

D. Ends of cabinets indicated to be installed directly against and completely concealed by walls or other cabinets are defined as "concealed."

E. Surfaces of Casework: Surfaces behind opaque doors, such as cabinet interiors, shelves, and dividers; interiors and sides of drawers; and interior faces of doors. Tops of cabinets 78 inches (1980 mm) or more above floor are defined as "semi exposed."

F. Concealed Surfaces of Casework: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

G. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive and faced both front and back with hardwood veneers.

H. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches (1.828 m) above finished floor and bottoms of cabinets more than 30 inches (0.762 m) but less than 42 inches (1.066 m) above finished floor.
   1. All front edges of shelving behind doors.

I. Concealed: Cabinets less than 30 inches (762 mm) above finished floor.
   1. Tops of cabinets over 78" above finished floor which are not visible from an upper level.
   2. Sleepers, web frames, dust panels and other surfaces not generally visible after installation and

1.5 PERFORMANCE REQUIREMENTS

A. System Structural Performance: Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
   1. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft
   2. Wall Cabinets (Upper Cabinets): 160 lb/ft.
   3. Shelves: 40 lb/ft.
   4. Delegated Design: Design laboratory casework, including comprehensive engineering analysis by a qualified professional engineer, using seismic performance requirements and design criteria indicated.
   5. Seismic Performance: Laboratory casework and support framing system or including attachments to other work and shall withstand the effects of earthquake motions determined according to New
      a. York State Building Code.

1.6 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

H. ICC (IFC) - International Fire Code; 2018.

I. NFPA 1 - Fire Code; 2018.

J. NFPA 30 - Flammable and Combustible Liquids Code; 2018.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. SEFA 3 - Laboratory Work Surfaces; 2010.

M. SEFA 7 - Laboratory Fixtures; 2010.

N. SEFA 8W - Laboratory Grade Wood Casework; 2016.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of casework with related items.
   1. Service Fixtures: Coordinate location and characteristics of service connections.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Keying Conference: Conduct conference prior to ordering keys. Incorporate conference decisions into keying submittal.

1.8 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Component dimensions, configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.

C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements placement dimensions and tolerances, clearances required, and utility locations, if any. Include coordinated information for laboratory equipment specified in another section and/or furnished by Owner.
   1. Indicate relationship of units to windows, doors, surrounding walls and other building components and attachments to other work.
   2. Submit CAD production shop drawings prepared by manufacturer for wood laboratory casework and countertops showing layout, elevations, ends, cross-sections, service run spaces, and location of services.
   3. Indicate locations of hardware and keying of locks, if any.
   4. Indicate locations and types of service fittings.
   5. Indicate locations of blocking and reinforcements required for installing laboratory casework.
   6. Include details of support framing system.
      a. Include coordinated dimensions for laboratory equipment specified in other Sections.

D. Minimum Sample Size: 2 inches by 3 inches (51 mm by 75 mm).

1. Provide one full size sample of finished base cabinet indicating corner, door and drawer details and construction, hardware and finish.
2. Unless otherwise directed, approved full-size Samples may become part of the completed Work, if in an undisturbed condition at time of Substantial Completion.
   a. Notify Architect of their exact locations. If not incorporated into the Work, retain acceptable full-size Samples at Project site and remove when directed by Architect.
3. Delegated-Design Submittal: For laboratory casework indicated to comply with seismic performance requirements, including analysis data signed and sealed by the qualified professional
   a. engineer responsible for their preparation.

E. Qualification Data: For qualified manufacturer.

F. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard

G. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

H. Test Reports: From independent laboratory indicating compliance with referenced chemical-resistance standards for cabinet finish and liner materials.

I. Manufacturer's installation instructions.

J. Manufacturer's Qualification Statement.

K. Installer's Qualification Statement.

L. Maintenance Data: Manufacturer's recommendations for care and cleaning.

M. Finish touch-up kit for each type and color of materials provided.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten (10) years of documented experience and has been tested for compliance with SEFA 8 .

B. Source Limitations: Obtain laboratory casework, including countertops, sinks, service fittings, and accessories, through one source from a single manufacturer.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

D. Quality Certification:
1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
5. Product Designations: Drawings indicate sizes and configurations of laboratory casework or by referencing designated manufacturer's catalog numbers.
   a. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with the Specifications may be considered. Refer to Section 01 2500 Substitution Procedures.

1.10 ADA AMERICANS WITH DISABILITIES ACT REQUIREMENTS:

A. The following special requirements shall be met, where specifically indicated on architectural plans as
1. "ADA" or “Handicapped”.:
2. Countertop height: with or without cabinet below not to exceed a height of 34 inches Above Finished Floor A.F.F., at a surface depth of 24 inches.

3. Knee space clearance: to be a minimum 27 inches A.F.F., and 30 inches clear span width.
4. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches
   a. A.F.F.
5. Wardrobe cabinets: to be furnished with rod/shelf adjustable to 48 inches A.F.F., and a maximum
   a. 21 inch shelf depth.
6. Sink cabinet clearances: in addition to above, upper knee space frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 11 inches, at a point 9 inches A.F.F. and as
   a. further described in Volume 56, Section 4.19.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

B. Acceptance at Site:
   1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.

C. Storage:
   1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" paragraph of this section.

1.12 MOCK-UP

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Locate where directed.

C. Mock-up may remain as part of the work.

1.13 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, utility roughing-in and wet work are complete and dry, and temporary HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not deliver or install wood product until the following conditions are met:
   1. Ceiling, overhead ductwork and lighting are installed.
   2. All painting is completed and floor tile is installed.
   3. Interior building temperature to be between 65o F and 80o F, and ambient relative humidity maintained between 25% and 55% prior to delivery, and during and after installation. Frequent and/or excessive changes in temperature and/or humidity levels during casework installation, or once casework is installed, must be avoided to prevent damage to materials.

1.14 COORDINATION

A. Coordinate layout and installation of framing and reinforcements for support of wood laboratory casework, and equipment furnished by others and installed in laboratory casework..

B. Coordinate installation of wood laboratory casework with installation of fume hoods and appliances and other laboratory equipment.

C. Coordinate installation of roughing with other prime contractors

D. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.

E. Coordinate installation of laboratory casework with installation of other laboratory equipment. and laboratory accessories

1.15 EXTRA MATERIALS

A. Furnish complete touch-up kit for each type and color of wood laboratory casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.

1.16 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion, at no additional cost to Port Chester-Rye UFSD. Defects include, but are not limited to:

1. Ruptured, cracked, or stained finish coating.
2. Discoloration, or lack of finish integrity.
3. Cracking or peeling of finish.
4. Failure of hardware.

PART 2 PRODUCTS

2.1 WOOD LABORATORY CASEWORK

A. General:

1. Certified Wood Materials: Provide cabinets with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
2. Adhesives: Do not use adhesives that contain urea formaldehyde.
3. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
4. Hardwood Plywood: HPVA HP-1, veneer core unless otherwise indicated made without urea formaldehyde.
5. Exposed Materials:
   a. General: Provide materials that are selected and arranged for compatible grain and color.
6. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings

B. Wood Laboratory Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.

1. Style: Lipped overlay with radiused edges doors and drawer fronts slightly at edges. Provide 1/8-inch reveals between doors and drawers that are adjacent.
2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
   a. Base Cabinets: 22 inches (559 mm).
   b. Tall Cabinets: 22 inches (559 mm).
   c. Upper Cabinets: 16 inches (406 mm).
3. Construction: Joints doweled, glued and screwed, except drawers may be lock-shoulder jointed; with interior of units smooth and flush; cabinet bottom flush with top of face frame; without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
4. Plywood: Hardwood plywood with face veneer of species indicated, selected for compatible color and grain. Grade A exposed faces at least 1/50 inch thick, and Grade J crossbands. Provide backs of same species as faces.
   a. Core:
      a) 7-ply (3/4" thick) and 9-ply (1" thick) veneer core plywood with cross and face plies bonded with Type II water-resistant glue; drawers are nine-ply, 1/2" thick.
   b. Face veneer:

a) Wood Species: Plain-sliced, Red oak grade A, selected for golden wheat color and narrow hearts.
b) Face Veneer Cut: Rotary cut

5. Semi Exposed Solid Wood: Clear hardwood lumber of species indicated and selected for grain and color compatible with exposed hardwood plywood .
   a. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects, of any species similar in color and grain to exposed solid wood.
   b. Plywood: Hardwood plywood of any species similar in color and grain to exposed plywood. Grade B faces and Grade J crossbands. Provide backs of same species as faces.
      a) Provide solid wood or hardwood plywood for semi exposed surfaces unless otherwise indicated.
6. Concealed Materials:
   a. Plywood: Hardwood plywood. Provide backs of same species as faces.

2.2 STRUCTURAL PERFORMANCE:

A. Structural Performance: In addition to the requirements of SEFA 3, SEFA 7, and SEFA 8W, components safely support the following minimum loads:
   1. Base Units: 500 pounds per linear foot (744 kgs/linear m) across the cabinet ends.
   2. Suspended Units: 300 pounds (136 kg) static load.
   3. Tables: 300 pounds (136 kg), minimum, on four legs.
   4. Drawers: 125 pounds (57 kg), minimum.
   5. Hanging Wall Cases: 300 pounds (135 kg).
   6. Shelves: 100 pounds (45 kg), minimum.
   7. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
      a. Component Importance Factor: 1.0.

2.3 WOOD CABINETS

A. Basis-of-Design Product: Subject to compliance with requirements, "Vanguard" as manufactured by Leonard Peterson & Co., Inc., Auburn, Alabama.
   1. Leonard Peterson & Co., Inc., Auburn, Alabama or comparable product by one of the following:
   2. See Section 01 2500 Substitution Procedures.

B. Grain Direction:
   1. Vertical on doors, horizontal on drawer fronts.
      a. Lengthwise on face frame members.
      b. Vertical on end panels.
      c. Horizontal on aprons and table frames.
   2. Provide veneers for each cabinet from a single flitch, book or slip and running matched a. Provide continuous matching of adjacent drawer fronts within each cabinet.
   3. Provide veneers for each elevation from a single flitch, book or slip and running matched .
      a. Provide continuous matching of adjacent drawer fronts within each cabinet and end matching between drawer fronts of adjacent cabinets.

C. Provide wood-faced laboratory casework of the following minimum construction:
   1. Bottoms of Base Cabinets and Tall Cabinets: 3/4-inch- thick hardwood plywood.
   2. Tops and Bottoms of Wall Cabinets and Tops of Tall Cabinets: 1-inch- thick veneer-core hardwood plywood.
      a. Ends of Cabinets: 3/4-inch- thick hardwood plywood.
         a) Shelves: 1-inch- thick veneer-core hardwood plywood.

3. Base Cabinet Top Frames: 1-by-3-inch solid wood with mortise and tenon or doweled connections, glued and pinned or screwed.
4. Base Cabinet Stretchers: 3/4-by-3-3/4 -inch panel product strips or solid wood boards at front
   a. and back of cabinet, glued and pinned or screwed.
5. Base Cabinet Sub tops: 3/4-inch- thick panel product glued and pinned or screwed.
6. Backs of Cabinets: 3/4-inch- thick, 1/2-inch- thick, hardwood plywood dadoed into sides, bottoms, and tops where not exposed.
7. Drawer Fronts: 3/4-inch- thick, hardwood plywood or solid hardwood.
8. Drawer Sides and Backs: 1/2-inch- (12.7-mm-) thick, hardwood plywood or solid hardwood dowel joints.
9. Drawer Bottoms: 1/4-inch- thick, veneer-core hardwood plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch- (12.7-mm-) thick material for drawers more than 24 inches wide.
10. Drawer Bodies: Steel drawer pans formed from 0.036-inch- thick metal, metallic phosphate treated, and finished with manufacturer's standard 2-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat and 2 mils for system.
11. Doors 48 Inches High or Less 3/4 inch thick, with particleboard or MDF cores, solid hardwood stiles and rails, and hardwood face veneers and crossbands.
12. Doors More Than 48 Inches High: 1-1/16 inches thick, with honeycomb cores, solid hardwood
    a. stiles and rails, and hardwood face veneers and crossbands.
13. Doors More Than 48 Inches High: 1-1/8 inches thick, with particleboard cores and hardwood face veneers and crossbands.
14. Stiles and Rails of Glazed Doors 48 Inches High or Less: 3/4-inch- thick particleboard with
    a. hardwood face veneers and crossbands.
15. Stiles and Rails of Glazed Doors More Than 48 Inches High: 1-1/16-inch- thick, solid wood with hardwood face veneers.

2.4 ADDITION REQUIREMENTS.

A. Glazing: Type and thickness standard with manufacturer

B. Framed Doors: Tempered glass, with gaskets and removable stops; minimize rattling and vibration.

C. Fittings and Fixture Locations: Cut and drill counter tops, backs, and other components for service outlets and fixtures.

D. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.

E. Removable back panels on base cabinets. Provide partial height back panels at sink cabinets.

F. Fixed panels at backs of open spaces between base cabinets and at ends of utility spaces not otherwise enclosed.
   1. Cutouts for power receptacles where indicated on drawings.

G. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.

H. Sloped Tops for Upper and Floor Cabinets: With closed ends, of matching construction and finish. Concealed anchorages for attachment to cabinet(s) below.

I. Factory-finish all exposed and semi-exposed surfaces with the same finish.

J. Finish Performance: Provide finish on all surfaces having chemical resistance of Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8W and no visible effect when surface is exposed to:

1. Hot water at temperature between 190 degrees F (88 degrees C) and 205 degrees F (96 degrees C) trickled down the test surface at 45 degree angle for 5 minutes.
2. Constant moisture in the form of 2 by 3 by 1 inch (51 by 76 by 25 mm) thick cellulose sponge kept continually saturated with water and in contact with test surface for 100 hours.
3. Preparation: Wood sanded smooth, free from dust and mill marks.
4. Coating: Clear, superior-quality, chemical-resistant acyclic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
5. Coats: Multiple coats as required to achieve minimum 1.5 mil (0.038 mm) dry film thickness.
   a. Appearance: Clear satin gloss; not cloudy or muddy.

K. Tables: With standard aprons manufactured of not less than 3/4 by 3 1/2 inch (19 by 89 mm) solid lumber, machined to receive corner blocks, and bolted to 2 1/8 by 2 1/8 inch (54 by 54 mm) solid hardwood legs. 3/8 inch (10 mm) leveling devices, and slip-on type black PVC shoes.
   1. Provide ADA compliant handicapped accesible utility tables, quantity and locations as indicated on drawings and as follows:
      a. Movable.
      b. Epoxy resin top.

L. Mobile Teacher's Demonstration Table
   1. Size: As indicated on drawings.
   2. Material: Match casework.
   3. Base Cabinet: Two door unit and 5-drawer unit all provided with locks, and 24” knee space.
   4. Hot and cold gooseneck mixing faucet.
   5. Epoxy resin sink, 18” x 14” x 10-1/2” deep. Mount as indicated on drawings.
   6. 1” epoxy resin counter top.
   7. Three way gas cock.
   8. Double AC receptacles.
   9. Support rod receptacle, barrette rod, tapered adapter with upright rods and crossbar.

M. Countertop And Sink
   1. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.
   2. 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. Durcon Company (The).
   3. Backsplash curb: Same material as top, 4 " up to 6" high, butt jointed and cemented to top. Provide where tops abut wall surfaces. Include end curb where top abuts end wall.
   4. Epoxy Tops, Sinks,: Factory molded of modified epoxy-resin formulation, uniform mixture and color throughout full thickness with smooth, nonspecular finish to match countertops. Provide sinks as per plans. And conforming to current State of New York Uniform Fire and Building .Code.
      a. Outlets: Provide with strainers and tailpieces, NPS 1-1/2 (DN 40), unless otherwise indicated.
      b. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inches (50 mm) less than sink depth. Provide in same material as strainer
   5. Physical Properties:
      a. Flexural Strength: Not less than 15,000 psi .
      b. Modulus of Elasticity: Not less than 2,000,000 psi. a. Hardness : Not less than 100.
         a) Water Absorption (24 Hours): Not more than 0.02 percent. c. Heat Distortion Point: Not less than 350 deg F .

c. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
   a) No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
   b) Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).
   c) Color: Black

2.5 PEGBOARDS

A. Epoxy pegboards with pre-drilled or punched holes in a staggered pattern, designed to accept removable white polypropylene pegs. With each pegboard include a stainless steel drip-trough with drain outlet and matching diameter 36 inches (914 mm) long PVC drain hose.
   1. Size: As indicated on drawings.

2.6 EYE WASH

A. A. Provide a handicapped accessible safety center fitted with eye wash fountain and faucet.
   1. Size: as shown on drawing.
   2. Provide key operated shut off valve.
   3. Provide emergency eyewash identification sign.
   4. All roughing and final connections by plumbing contractor.
   5. Overhead shower head to be provided by Plumbing Contractor.
   6. Shower curtain tester to be provided by Plumbing Contractor.
   7. Product: Eyewash Saf-T Lok as manufactured by Encon; www.enconsafety.com. Include deck mounted faucet.

2.7 WOOD FINISH (TO BE ENVIRONMENTALLY FRIENDLY, WATER BASED)

A. Preparation: Sand lumber and plywood before assembling. Sand edges of doors, drawer fronts, and molded shapes with profile-edge sander. Sand after assembling for uniform smoothness at least equivalent to that produced by 220-grit sanding and without machine marks, cross sanding, or other surface blemishes.
   1. Staining: Remove fibers and dust and apply stain to exposed and semi exposed surfaces as necessary to match approved Samples. Apply stain in a manner that will produce a consistent appearance. Apply wash-coat sealer before applying stain to closed-grain wood species.
   2. Stain Color: As selected by Architect from manufacturer's full range .

B. Chemical-Resistant Finish: Apply laboratory casework manufacturer's standard two-coat, chemical-resistant, transparent finish. Sand and wipe clean between coats. Topcoat(s) may be omitted on concealed surfaces.
   1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.

C. Chemical Resistance Test Procedure: .

D. Finished panels shall be oriented horizontally and vertically during exposure to the test chemicals.
   1. Chemical concentrations shall be adjusted by the volume method. Ambient temperature and chemical temperature shall be 68-72F. At the end of the test period, the surface shall be washed with detergent and warm water. Areas exposed to solvents shall be cleaned with a cloth dampened with the respective solvent. Prior to evaluation, 16-24 hours after the chemicals have been removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels
   2. Horizontal Test: Apply 5 drops of the acid, base or salt substance to correspondingly numbered areas of the surface to be tested. Position a 1" diameter watch glass in the liquid, convex side

downward. Solvents shall be applied by saturating a 1" ball of cotton, then covering with an inverted two-ounce wide-mouth bottle. Test duration shall be one hour.

3. Vertical Test: The test surface shall be marked to indicate divisions; 12" high, 3/4" wide, and numbered to identify the chemicals. Five drops of each substance shall be applied to its respective numbered area in a vertical track pattern to prevent crossover. Test duration shall be two hours.
4. Ratings:
   a. Excellent - Indicates excellent to superior integrity of finish film. No effect or slight change in gloss and slight discoloration.
   b. Good - Allows change of gloss or discoloration or slight swelling while retaining integrity of finish film
   c. Poor - Obvious and significant deterioration, including blistering, pitting, cratering, erosion and/or loss of finish material.

E. Test results (minimum requirements):

REAGENT	HORIZONTAL	VERTICAL
REAGENT	TEST RATING	TEST RATING
Nitric Acid, 10%	Excellent	Excellent
Nitric Acid, 25%	Good	Good
Sulfuric Acid, 25%	Excellent	Excellent
Sulfuric Acid, 50%	Good	Excellent
Acetic Acid, 50%	Excellent	Excellent
Acetic Acid, 75%	Good	Excellent
Phosphoric Acid, 50%	Excellent	Excellent
Phosphoric Acid, 75%	Excellent	Excellent
Hydrochloric Acid, 20%	Excellent	Excellent
Hydrochloric Acid, 37%	Good	Excellent
Butyl Alcohol	Excellent	Excellent
Ethyl Alcohol	Excellent	Excellent
Methyl Alcohol	Excellent	Excellent
Ethyl Acetate	Good	Excellent
Ethyl Ether	Good	Excellent
Methyl Ethyl Ketone	Good	Excellent
Toluene	Good	Excellent
Acetone	Good	Excellent
Naphtha	Excellent	Excellent
Xylene	Good	Excellent
Kerosene	Excellent	Excellent
Sodium Hypochlorite, 5.25%	Excellent	Excellent
Sodium Hydroxide, 25%	Excellent	Excellent
Sodium Hydroxide, 35%	Excellent	Excellent
Sodium Hydroxide, 40%	Excellent	Excellent
Sodium Hydroxide, 50%	Excellent	Excellent
Potassium Hydroxide, 40%	Excellent	Good

Potassium Hydroxide, 45%	Excellent	Excellent
Zinc Chloride Saturated	Excellent	Excellent
Sodium Chloride Saturated	Excellent	Excellent
Sodium Carbonate Saturated	Excellent	Excellent
Glycerin	Excellent	Excellent
Hydrogen Peroxide, 30%	Excellent	Excellent

2.8 HARDWARE

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Stainless-steel, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide 2 for doors 48 inches high or less and 3 for doors more than 48 inches high.

C. Sliding Door Pulls: Stainless-steel.
   1. Design and Size:Recessed flush pulls as selected from manufacturer's full range.

D. Pulls: Rectangular stainless steel fastened from back with two screws. For sliding doors, provide stainless-steel or chrome-plated recessed flush pulls. Provide 2 pulls for drawers more than 24 inches in width.

E. All pulls are mounted horizontally on drawers and vertically on doors

F. Door Catches:Nylon-roller spring: catches. Provide 2 catches on doors more than 48 inches high.

G. Drawer Slides:
   1. Standard use and knee space drawers shall be Accuride 3832 series or equal with epoxy finish. Slides will have a 150 pound dimatic load rating at full extension and a built-in, positive stop both directions, with self closing feature. Slides shall have a lifetime warranty as offered by the slide manufacturer.
      a. File drawer slides shall be full extension. Slides shall have a lifetime warranty as offered by the slide manufacturer.

H. Label Holders: Stainless steel, aluminum, or chrome plated; sized to receive standard label cards approximately 1 by 2 inches , attached with screws or rivets. Provide on all drawers .

I. Locks for Wood Cabinets: Cam type with 5 disc tumbler , brass with chrome-plated finish; complying with BHMA A156.11, Type E07281
   1. Provide a minimum of two keys per lock and two master keys.
      a. Provide on all drawers and doors.
         a) Keying: Key locks within each room alike, key each room separately.
      b. Master Key System: Key all locks to be operable by master key.

J. Adjustable Shelf Supports for Wood Cabinets: Double pin type,nylon with anti-tipping seismic feature. Each clip is capable of supporting 400 #.

2.9 METAL GRILLS

A. Metal Grilles: Where metal grilles are indicated for countertops and/or base cabinets to permit thermal heat flow, they shall be as follows:
   1. Countertop and Similar Deck Applications: Heavy gauge extruded aluminum construction, bar type, linear design with natural anodized finish. Frame to have a 5/8" perimeter boarder and frame is to have concealed fastenings and reinforcing bands. Exposed screws in top of frame will not be accepted. Core of frame must be removable allowing for cleaning and servicing of fin tubing below and core is to be held in place by spring clips. The core consists of pencil proof design with deflecting bars 1/8" wide and placed on 1/4" centers. Sizes to be as shown on drawings.

a. Model # AAG-100/B frame as manufactured by Advance Architectural Grills, New Hyde Park, NY; 516-488-0628 approved equal.

2. Base Grill Units: Twelve (12) gauge extruded aluminum construction, Design E, 1/4" wide openings, 1/8" satin finish aluminum, counter-sunk tamperproof screws.
   a. Manufactured by A.J. Manufacturing, Kansas City, MO, or equal.
3. Lengths shall match the length off the baseboard

2.10 REFLECTIVE INSULATION:

A. Where base cabinets are located on exterior walls and in front of fin tube radiation, provide Class A fire rating exterior wall and/or back of cabinet.
   1. Thermo-ply composed of high-quality, long fibered specially treated water- and weather-resistant plies. Plies are pressure laminated.
   2. Structural Grade: Red
   3. Fire Rated : 1 hour in accordance with ASTM E-19
   4. Perm Rating: 0.53- 0.63.
   5. Thickness: 0.113
   6. R value: 4.2
   7. Manufacturer: Ludlow Coated Products. www.ludlowcp.com Product: Structural Grade Red.

2.11 WATER SERVICE FITTINGS

A. General: Comply with requirements of SEFA 7.

B. 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 :
   1. WaterSaver Faucet Co.

C. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures - Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.
   1. Provide units that comply with "Vandal-Resistant Faucets and Fixtures" recommendations in SEFA 7

D. Materials: Fabricated from cast or forged red brass unless otherwise indicated.
   1. Finish: Chromium plated unless otherwise indicated.

E. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig .
   1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
   2. Provide aerators on water fittings that do not have serrated outlets.

F. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf (22 N) to operate.
   1. Provide units designed for working pressure up to 75 psig (520 kPa), with serrated outlets.
   2. Where ball valves are indicated for fuel-gas use, provide locking safety handles that must be pushed in or pulled up] unless otherwise indicated].

G. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."

H. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

2.12 ACCESSORIES

A. Label Holders: Manufacturer's standard size and mounting, chrome-plated steel, for drawer fronts and cabinet doors indicated.

B. Toe space Grilles: Manufacturer's standard grille.

C. Teacher's desk signage: Contractor shall provide durable plastic sign mounted to side of cabinet in contrasting color incorporating the wording "No acid or base in sinks".

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Environmental Conditions:
   1. Do not deliver casework until the following conditions have been met:
      a. Building has been enclosed (windows and doors sealed and weather-tight).
      b. An operational HVAC system or temporary heat that maintains temperature and humidity at occupancy levels has been put in place.
      c. Ceiling, overhead ductwork, piping, and lighting have been installed.
      d. Installation areas do not require further “wet work” construction.

B. Verify adequacy of support framing and anchors.

C. Verify that service connections are correctly located and of proper characteristics.

3.2 INSTALLATION

A. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

B. Set casework items plumb and square, securely anchored to building structure.

C. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close all gaps.

D. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch (1.6 mm). In addition, do not exceed the following tolerances:
   1. Variation of Tops of Base Cabinets from Level: 1/16 inch (1.6 mm) in 10 feet (3 m).
   2. Variation of Faces of Cabinets from a True Plane: 1/8 inch (3 mm) in 10 feet (3 m).
   3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch (0.8 mm).
   4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch (1.6 mm).

E. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches (407 mm) on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

G. Countertops: Install countertops in one true plane, with ends abutting at hairline joints, and no raised edges.

H. Coordinate with mechanical and electrical outlets with casework and other prime contractors.

I. Replace units that are damaged, including those that have damaged finishes.

3.3 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly, and close properly flush.

3.4 CLEANING

A. Clean casework and other installed surfaces thoroughly.

3.5 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.

B. Protect casework and countertops from ongoing construction activities. Prevent installers from standing on or storing tools and materials on casework or countertops.

C. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

3.6 SERVICE-FITTING SCHEDULE

A. All service fittings to be Vandal proof.

B. Water Service Fitting, Type WF-VR317XKCP:
   1. Type of Fitting: 6" Rigid, gooseneck mixing faucet
   2. Outlet: Atmospheric Vacuum breaker Full flow nozzle.
   3. 4" Vandal Proof Wristblade Handle.
   4. Ceramic 1/4 Turn Operating Cartridge.
   5. 1/2" NPSM Supply Inlets and Coupling Nut for 3/8" or 1/2" Flexible Riser
   6. Atmospheric Vacuum Breaker, Not Intended for Continuous Pressure Applications
   7. All Threaded Connections Factory Assembled
   8. Anti-Rotational Body Deck Pin to Prevent Turning
   9. Mounting: Deck mounted.
   10. Location: All student work counters

C. Water Service Fitting, WF-1100-GN2AE3-317CP:
   1. 2. 5 1/4" Rigid / Swing Gooseneck Spout.
   2. 3. 2.2 GPM (8.3 L/min) Aerator
   3. 4. 4" Wristblade Handle
   4. 5. Quaturn Compression Operating Cartridge
   5. 6. 1/2" NPSM Supply Inlets and Coupling Nut for 3/8" or 1/2" Flexible Riser
   6. 7. Chrome Plate Finish
   7. 8. Location: All utility sinks

D. Refer to Eye Wash for fittings provided with eye wash.

END OF SECTION

SOLID SURFACING WINDOW SILLS AND COUNTERTOPS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Window sills.

B. Countertops for manufactured casework.

1.3 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry for wood blocking.

B. Section 08520 - Aluminum Windows

C. Section 12 3200 - Plastic Laminated Casework.

D. Section 12 3553 - Wood Laboratory Casework: For epoxy resin laboratory countertops.

E. Section 22 4000 - Plumbing Fixtures: Sinks.

1.4 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

E. PS 1 - Structural Plywood; 2009.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation .

D. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section, with minimum ten years of documented experience.

B. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.

4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 FIELD 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.

PART 2 PRODUCTS

2.1 WINDOW SILL AND COUNTERTOP ASSEMBLIES

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Solid Surfacing Window Sills and Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate:
   1. Flat Sheet Thickness: 1/2 inch (12.5 mm), minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         a) Dupont: www.corian.com.
      b. Substitutions: 01 2500 - Substitution Procedures.
   3. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 25, maximum; when tested in accordance with ASTM E84.
   4. Finish on Exposed Surfaces: Polished, gloss rating of 55 to 80.
   5. Color and Pattern: As indicated on finish schedule.

2.2 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

C. Joint Sealant: Mildew-resistant silicone sealant, color as selected..
   1. Mildew resistant conforming to FDA NSF 51, UL listed.

2.3 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and sides 1 inch (25 mm) or as shown on drawings.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches (102 mm), unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 72 inches (1800 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions. Form joints between components to be non conspicuous.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo P.C. of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Verify dimensions of all existing countertops to be replaced.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach solid surfacing window sills using compatible adhesive and mechanical fastened.
   1. Countersink screws and plug opening with matching material.

C. Attach solid surfacing window sills using compatible silicone bonding material.

D. Seal joint between window sills back and end splashes and adjacent surfaces.

E. Provide products in largest pieces available.

F. Cut and finish edges with clean sharpe returns.

G. Provide radius at outside corners.

H. Dress joints smooth, remove surface scratches and clean entire surfaces.

I. Installation of Countertops
   1. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
      a. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Prepare edges in shop for field-made joints.
         a) Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.
      b. Fastening:
         a) Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
         b) Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
            (a) Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
      c. Provide required holes and cutouts for service fittings.

a) Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.

b) Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.

c) Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

J.

3.4 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

3.5 CLEANING

A. Clean surfaces thoroughly. Remove adhesives, sealant and other stains.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Carpet mat.

B. Recessed mat frames.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.

C. Shop Drawings: Indicate dimensions.

D. Samples: Submit two samples, 12 by 12 inch (300 by 300 mm) in size illustrating pattern, color, finish, edging.

1.4 QUALITY ASSURANCE

A. Flammability: Critical radiant flux 0.45 watts/m2 or greater, in accordance with ASTM E648. Life Safety Code® NFPA 101, Class 1 Interior Floor Finish Testing and Classification

B. Slip Resistance: Coefficient of friction 0.60 or greater, in accordance with ASTM D2047 tested in wet conditions

C. Rolling Load: No deformation with 300 lb/wheel and minimum of 2500 passes. Load applied to a 5” diameter, 2” wide solid polyurethane wheel.

D. Single Source: Obtain entrance matting and frames from a single source to ensure dimensional compatibility

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened original factory packaging, labeled to identify product and manufacturer. Store in controlled environment. To avoid damage do not stack other material on top of matting or frames

1.6 PROJECT CONDITIONS

A. Coordinate installation of recess frame with concrete construction. Install frames to ensure Dimensions provided in shop drawings are maintained. Finished recess must be flat and level. Defer frame installation until related interior finish work is in progress

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Floor Mats:
   1. Pawling Corporation: www.pawling.com/#sle.
   2. Substitutions: to Section 01 2500 Substitution Procedures.

2.2 MATERIALS

A. Aluminum: ASTM B221, alloy 6105-T5 and 6063-T5 for extrusions.

B. Architectural Bronze: ASTM B455, alloy 385 for extrusions.

C. Rigid Vinyl: High impact, rigid PVC.

D. Flexible Vinyl: 80 Durometer, flexible PVC.

E. Tread Inserts: Refer to section 2.33.

2.3 ENTRANCE MATTING

A. Pawling Corporation model EM-500 Rol-Dek® Entrance Matting. Manufactured from rigid vinyl treadrail extrusions spaced at 1 7/8" centers, connected by continuous rigid vinyl hinges perforated to provide drainage. Tread rails to include continuous flexible vinyl cushion for contact with substrate and tread rail insert for exposed walking surface. Tread rails anodized aluminum black anodized finishes. Tread Inserts

1. Maxi-Tuft Long Wear "MLW" Carpet: Spaced dyed, 100% polyamide nylon, tetra-lobal fibers, 30oz/sqyd available in manufacturer's standard colors. Carpet fibers fusion bonded to continuous two-ply rigid backing. Carpet fibers incorporate anti-stain, anti-static, and anti-microbial additives.

B. Framing

1. Level Bed: Model MRF-1002, alloy 6063-T5 extruded aluminum recessed framing. Installed frame provides 3/16" exposed perimeter trim and a 7/16" deep recess. Aluminum frame standard black anodized finish.
2. Surface Frame: BSF-225, alloy 6105-T5 extruded aluminum bevel frame with medium grit abrasive insert. Surface installed to provide 2" wide, ADA compliant, beveled perimeter trim and a 7/16" deep recess. Black anodized finishes with abrasive.

2.4 FABRICATION

A. Construct recessed mat frames square, tight joints at corners, rigid. Coat surfaces with protective coating where in contact with cementitious materials.

B. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that floor surface for mats are ready to receive work.

3.2 PREPARATION

A. Mats: Verify size of floor recess before fabricating mats.

B. Vacuum clean floor recess.

3.3 INSTALLATION

A. Install frames to achieve flush plane with finished floor surface.

3.4 TOLERANCES

A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch (6 mm).

END OF SECTION

TELESCOPING BLEACHERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Telescopic Gym Seating includes electrically operated multiple-tiered seating rows comprising of seat, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.

B. Electric motor operators, controls, and internal wiring.

1.3 RELATED REQUIREMENTS

A. Section 09 6429 - Wood Strip and Plank Flooring.

B. Section 09 9123 - Interior Painting.

C. Section 11 6623 - Gymnasium Equipment.

D. Section 26 0300 Wiring and Cables for connection of electric motors and controls.

E. Section 26 0400 Wiring Devices for key-operated wall switch(es).

1.4 REFERENCE STANDARDS

A. Aluminum Association (AA): AA - Aluminum Design Manual.

B. American Institute of Steel Construction (AISC): AISC 360- Steel Construction Manual.

C. American Iron & Steel Institute (AISI): AISI S100 - Design of Cold Formed Steel Structural Members.

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

E. American Wood Council (AWC): National Design Specification for Wood Construction.

F. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.

G. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2016.

H. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2016.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

J. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures; 2016.

K. NFPA 70: National Electrical Code.

L. Forest Stewardship Council: Chain of Custody Certification (FSC-STD-40-004)

M. International Building Code (IBC): 2015

N. International Code Council (ICC): 2015 ICC 300: Standard for Bleachers, Folding and Telescopic Seating and Grandstands.

O. NY State Uniform Building Code.

P. Southern Pine Inspection Bureau (SPIB): SPIB: Standard Grading Rules for Southern Pine.

Q. PS 1 - Structural Plywood; 2009.

R. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

S. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage handling and requirements.
   3. Installation methods.

C. Shop Drawings: Complete layout with dimensions, seat heights, row spacing and rise, aisle widths and locations, points of connection to substrate, assembly dimensions, and material types and finishes.
   1. Provide drawings customized to this project.
   2. Include Professional Engineer certification.
   3. Wiring Diagrams: Show locations of motors, electrical wiring, and rough-in connections.
   4. Graphics Layout Drawings: Indicate pattern of contrasting seat colors.

D. Selection Samples: For each material for which color selection is required, submit samples, 2 by 2 inches (50 by 50 mm) in size, illustrating colors and finishes available.

E. Verification Samples: For each custom colored finish, submit samples of actual finish or product, for verification of color selection.

F. Welding certificates.

G. Product Test Reports: Load test to all loads, observed by a qualified independent testing laboratory, and certified by a registered professional structural engineer verifying the integrity of the manufacturer's design.

H. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions, including annual inspection and maintenance and bi-annual inspection by a Professional Engineer or manufacturer factory service personnel.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 20 years of documented experience including continual design enhancement and 15 year minimum product life-cycle support of telescopic seating.

B. Installer Qualifications: Ten projects of similar size, complexity and in service for at least five years. and Approved by manufacturer.

C. Welder Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel." and certified by AWS for the process employed.

D. 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.

1.7 PROJECT CONDITIONS

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping stands installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver telescoping stands in manufacturers packaging clearly labeled with manufacturer name and content.

B. Handle bleacher equipment in a manner to prevent damage.

C. Deliver the telescoping stands at a scheduled time for installation that will not interfere with other trades operating in the building when at all possible.

D. Store, in original packaging, under cover and elevated above grade.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Warranty: Includes the repair or replacement of the defective product; or defective component thereof, with a comparable product; or component thereof, or a refund of the purchase price prorated over the warranty period.

1. Includes: Labor, materials, and freight for replacement or repairs.
2. Structural Component parts of Understructure Warranty Period: 10 years from Date of Acceptance
3. Decking systems, Classic and Wood Seating collections, electrical, portable and integral dolly systems, end closure curtains, surface material finishes Warranty Period 5 from Date of Acceptance.
4. Bleacher company to provide five (5)year plan for inspections and routine maintenance (oil and lubrication as required) to bleachers at no added cost per bid. Cycle, once per year.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Telescoping Bleachers:

1. Substitutions: Section 01 2500 Substitution Procedures..

2.2 TELESCOPING BLEACHERS

A. Wall-Attached Telescoping Stands: Forward-folding system with the rear of the understructure permanently attached to the floor and to the rear wall

1. Telescoping Bleachers: Factory assembled tiered benches that retract horizontally into depth approximately the same as a single row depth, with fixed seats mounted on leading edge of platforms.
2. Provide a design certified by a licensed Professional Engineer licensed in the State of New York.
3. Provide a design that has been in use for 15 years; submit documentation.
4. Design to comply with applicable requirements of NFPA 102 and requirements of code authorities having jurisdiction; where conflicts between requirements occur, comply with whichever is more stringent.
5. Design with solid fascia (riser) or seat fronts that conceal interior mechanisms when fully retracted, fitting tightly enough to prevent climbing up face; at front row provide key locked, hinged fascia (skirt) to cover gap between seat riser/fascia and floor.
6. Configurations: As indicated on drawings.
7. Wheelchair Spaces: Allow portions of first row, as indicated, to be manually retracted without affecting other rows; provide removable railings at row two behind wheelchair spaces in compliance with ADA Standards.
8. Cutouts: Fit units to irregular wall surfaces, columns, pilasters, roof drain leaders, and other obstructions; take field measurements prior to fabrication.
9. Operation: Motor operated.

B. Design Loads: Design to withstand the following loading conditions:

1. Uniformly distributed Live Load on Structural Supports: 100 psf (4.8 kPa), minimum, of gross horizontal projection.
2. Live Load on Seats and Walking Surfaces: 120 pounds per linear foot (1750 N/m) on seats and decking.

3. Parallel Lateral Sway Stress on Structural Supports: 24 pounds per linear foot (350 N/m) of row combined with (1.) above.
4. Perpendicular Sway Stress on Structural Supports: 10 pounds per linear foot (146 N/m) of row combined with uniformly distributed live load above.

C. Dimensions:
1. See drawings for overall dimensions.
2. Rise Per Row: 10 inches (254 mm).
3. Row Depth: 22 inches (589 mm).
4. Seat Height Above Tread: 6 inches (150 mm).

D. Structural Supports: Steel or aluminum; manufacturer's standard wheeled carriages supporting each tier separately, with moving parts permanently lubricated and metal parts cushioned to prevent metal-to-metal contact during operation.
1. Design so that each row carriage so that it will individually support the design loads and is self supporting when fully assembled without dependence on platform panels or boards, seats, or fascia.
2. Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
3. Bolting: Use lock-washers or locknuts.
4. Wheels: Minimum 5 inch (125 mm) diameter by 1-1/8 inch (28 mm) wide, with non-marring rubber tires; ball, roller, or oil-impregnated metal bearings; minimum of 2 wheels at each floor support.
5. Finish: Manufacturer's standard enamel or powder coating.
6. Row Locking: Automatically mechanically lock each carriage to adjacent carriages when fully extended.
7. Unlocking (Manual): Provide single manual release mechanism to allow retraction of all carriages, concealed behind skirt board of first row.
8. Unlocking: Automatically unlock all rows before engaging retraction mechanism.

E. Motor Operation: Manufacturer's standard drive mechanism, using motor adequately sized for the purpose.
1. Provide UL listed electrical components and wiring.
2. Controls: Start, Stop, Forward, and Reverse in a single control unit.
3. Control Station: Removable plug-in low-voltage pendant station, with first-row plug-in location for each motor.
4. Limit Switches: Automatically stop operation when unit has reached fully open or fully closed position.
5. Provide all wiring internal to bleacher units, to junction box located where indicated; ensure that wiring is not energized except during operation.
6. Electrical Characteristics: 120V, single phase, 60 Hz.
7. Provide access to motor from front side of bleachers; a hinged front skirt or hinged section at least 30 inches (760 mm) wide is acceptable.

2.3 DIMENSIONAL AND OPERATIONAL CRITERIA

A. Dimensions:
1. Bank Length:
   a. Bank A: 96’-6” (included self-storing end rails)
   b. Bank B: 96’-6” ((included self-storing end rails)
2. Aisle Width: all intermediate aisle steps are to be 4’-6” wide; with the front steps all being 7’-6” wide.
3. Number of Tiers: Both banks A & B are to be 8 seating tiers.

4. Row Spacing: 24 inches (610 mm) with the last full row depth of 26 inches (660 mm) The top deck depth of 13 1/16" (332 mm) +-1/4" 6.4 mm)
5. Select dimensions required for row rise in paragraph below.
6. Row Rise measured at walking surface:
   a. 1st row rise: 10-9/16" (268.3 mm) +-1/8" (3.2 mm)
      a) 2nd row rise thru top row: 9-5/8" (244 mm)
7. Open Dimension: Measured from rear wall to front leading edge of front steps, 16'-2 13/16" (4945 mm) +- 1" (25.4 mm)
8. Closed Dimension: 4'-8" (1422.4 mm) +-1" (25.4 mm)
9. Overall Unit Height: 7'-0 3/8" (2143.1 mm) +- ¼" (6.4 mm) Measured from walking surface to top of top row bench seat (not including media platform),
10. Net Capacity: 860 seats
    a. Media platform in usable configuration: 852 seats
11. Maximum Net Capacity; with Flex Row Fully Recovered: 812 seats
    a. Media platform in usable configuration: 844 seats

B. Operation:
1. Powered Automatic, wireless control unit.
   a. Limit Switches: Automatically stop integral power system when telescoping stands reach fully opened or closed positions.

2.4 SEAT AND PLATFORM COMPONENTS

A. Seat/Fascia Assembly: Continuous, molded UV-stabilized high-density polyethylene HDPE high density plastic, seat minimum 1 inch (25 mm) thick, textured finish, homogeneous color throughout, color as selected from manufacturer's standard selection; approximately 18 inch (460 mm) long sections independently removable with tongue-and-groove or rabbeted interlock at end joints.

B. Seat module are to be full molded seat modules; Modifications are not acceptable
1. All bench seats must be full length modules +-1/4" (6.4 mm).
2. No cutting of modules to deviate lengths less than 17 3/4" is acceptable.
3. Spacing seats is acceptable, if seat spacer is a fully manufactured module that can also be included later as a parts order for upgrade.
4. Seat Depth: 10 inches.
5. Seat height range from deck to top of seat: 16-1/8 inches (410 mm) to 18-1/4 inches (464 mm).
6. Capacity: Tested to 600 pounds.
7. Shape: Ergonomically contoured, with internal ribs spaced for natural flexibility; rear edge cantilevered to provide toe room of not less than 3 inches (75 mm); no openings to trap debris.
8. Fire Retardance: Self-ignition temperature of 650 degrees F (343 degrees C) or greater when tested in accordance with ASTM D1929; smoke developed index of 450 or less, when tested in accordance with ASTM E84, or 75 or less when tested in thickness intended for use in accordance with ASTM D2843; and burning extent of 1 inch (25 mm) or less when tested in thickness intended for use in accordance with ASTM D635.
9. Provide end caps of same material and finish on each exposed end.
10. Supports: Internal steel reinforcement of each seat segment bolted to platform nose member; minimum two bolts per segment.
11. Seat and Row Numbers: Provide recessed pockets and number plates.
12. Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.
13. Product: Courtside Collection "XC10".

C. Platform, Tread, and Step Structure: Plywood continuously supported on front and rear with side joints tongue-and-grooved.

1. Plywood: PS 1, 5-ply southern pine or polyethylene-overlaid douglas fir or southern pine, Grade A-C.
2. Plywood Thickness: 5/8 inch (16 mm), minimum.
3. Front (Nose), Rear, and Intermediate Supports: Steel channel or tube, hot-dipped galvanized.
4. Provide end caps of same material and finish on each exposed end.
5. Finish: High gloss clear urethane, both sides, unless polyethylene finished.
6. Nosings: Extruded aluminum; clear anodized finish.
7. At aisles provide permanently attached intermediate steps of same construction and finish.
8. At bottom of aisles provide step in front of first riser, hinged to first platform to fold for storage.

D. Understructure:
1. Finish: Rust-inhibiting black finish
2. Hardware finish: Zinc-plated, Rust inhibiting black finish
3. Posi-locks and other surfaces: Powder coated black
4. Nose beam and Rear Riser beam: Nose beam shall be continuously roll-formed closed tubular shape of ASTM A653 grade 40 (276 MPa). Riser beam shall be continuously roll-formed of ASTM A653 grade 40 (276 MPa). Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly. Nose beam and riser beams are through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.
5. Frame: The frames are welded assemblies (one left hand, one right hand per tier) comprised of the following components:
   a. Lower Track sub-assembly: ASTM A1011 Grade 50: Continuous Positive Interglide System (casterhorn) interlocks each adjacent frame casterhorn using an integral, continuous, anti-drift feature and captive interlock with adjustable row spacing at front to prevent separation and misalignment.
   b. Lower Track Wheels: 3 per frame Not less than [5 inches (127 mm)] diameter by [1-1/4 inches (32 mm)] with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit [3/8 inch (10 mm)] diameter axles secured with E-type snap rings.
      a) Option: up to 6 wheels per frame for load distribution
   c. Slant Columns: A500 Grade B, tubular shape.
   d. Cantilever Sub-assembly: Consists of ASTM A1011 Grade 50 nose connection plate, cantilever, and riser attachment plate welded together into a sub-assembly.
6. Lock system: Casterhorns at the end sections of powered banks (minimally), and manual sections, contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.
7. Sway Bracing: ASTM A653 grade 40 (276 MPa), tension members bolted to columns.
8. Deck Stabilizer: A1011 Grade 45, member through-bolted to nose and riser at three locations per section. Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment.

E. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.5 HANDRAILS AND RAILINGS

A. Provide the following railings:
1. Center Aisle Rails:
   a. Auto-Rotating
      a) Provide single pedestal mount handrails 34 inches (864mm) high with terminating mid rail. Permanently attached handrail shall rotate in a permanently mounted socket for rail storage. During the opening process of the bleacher or closing of the

bleacher, the aisle hand rails shall automatically rotate, lock in the use position, unlock and rotate back to the stowed position as the gym seats open and close. Ends of the handrail shall return to the post, and not extend away from it. Rails having openings to avoid interference with closed decks are not acceptable

b. Material and Finish: [Semi-gloss][Gloss] powder coated steel.

c. Color: Black textured powder coat epoxy finish.

2. End of Row Guardrails: Self-storing, at open ends of sections beginning at row 2, 42 inches (1066mm) high above seat, end rail with tubular supports and intermediate members designed with 4 inch (102mm)] sphere passage requirements.

3. Height: 42 inches (1067 mm) above adjacent platform or tread.

B. Design handrails and railings to withstand the following loads:

1. Concentrated Load on Handrails: 200 pounds (890 N) at any point in any direction.

2. Concentrated Load on Guardrails: 200 pounds (890 N) in any direction along top rail.

3. Live Load on Handrails: 50 pounds per linear foot (790 N/m), applied in any direction.

4. Live Load on Guardrails:

a. Horizontal: 50 pounds per linear foot (790 N/m), applied at the guardrail height.

b. Vertical: 100 pounds per linear foot (1460 N/m), applied vertically to top of guardrail.

C. Railing Construction: Round aluminum pipe or tube, with formed elbows at corners and caps at ends of straight runs.

1. Aluminum: 1.66 inches (42 mm) minimum outside diameter; natural anodized finish.

2. Steel: 1-1/2 inch (38 mm) minimum outside diameter, with 11 gage, 0.12 inch (3.05 mm) minimum wall thickness; Black textured powder coat epoxy finish.

2.6 ELECTRICAL OPERATION SYSTEMS

A. Integral Power

1. Default operation shall be with a removable pendant control unit which plugs into seating bank for tethered operator management of stop, start, forward, and reverse control of the power operation. Other modes of operation are optional.

B. PF1: Furnish and install Hussey PF 1, an integral automatic electro mechanical powered frame propulsion system, to open and close telescopic seating.

1. Electrical - Seating Manufacturer shall provide all wiring within seating bank, including pendant control. Motors, housing, and wiring shall be installed and grounded in complete accord with the National Electrical Code. The electrical contractor shall perform all connections at and upstream of the equipment specified herein, and ensure that supplied voltage drops no more than 4% below nominal where power connects thereto. To prevent 3rd party control of the system, power is made available to the (Remote Control Receiver for a limited time by a Radio Frequency Identification (RFID) system that requires activation by the operator. Once the power system is activated, an audio beep and visual light is active to notify the user that the system is energized and ready for operation. The wireless remote shall be used by trained authorized operators to open and close the system with continuous pressure applied to the desired button.

2. Each unit for PF1is driven by a 1/2 horsepower, 1725 RPM motor.

a. 208V 3 Phase:

a) This 1.25 Service Factor motor runs on 208V at 60 Hz and draws a full load current of 2.21.8 amperes. The required power supply shall be 3 asynchronous phases of 120 Volts each, plus neutral plus ground, each with 20 Amp capacity.

b) This system shall be UL Listed in its entirety (motors, circuit protection, motor controls, user interface, enclosures, conductors and connectors all evaluated and approved for correct sizing and compatibility under maximum rated load on the motors) under UL Product Category FHJU, titled Electrical Drive and Controls for Folding and Telescopic Seating.

b. Each pair of Powered Frames shall consist of output shaft gear reducer with [6 inch (152mm)] diameter x [4 inch (102mm)] wide wheels covered with non-marring [1/2 inch (13mm)] thick composite rubber, and operate the bleacher as follows:
   a) PF1 - Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 2 drive wheels. Max pull approx 261 lbs [1161 N];

C. Options
1. Plug & Play Power
   a. The Plug & Play option enables safe cord and plug connection of the power system to the power supply, eliminates the need for a separate disconnect, and eliminates lockout tagout procedures at the bleacher. Electrical contractor shall provide and install the disconnect-rated receptacle and associated parts specified by the manufacturer. Manufacturer shall specify facility preparations for and furnish and install a cord-and-plug connected power system. This option is available only with 208V 3 Phase.
2. Limit Switches
   a. Limit switches will automatically stop integral power operation when seating has reached the fully extended or closed position. Manufacturer shall furnish and install both open and closed limit switches for the integral power system. Power operation shall utilize a combination of contactors and limit switches to insure the wiring is not energized except during operation.
3. Remote Control
   a. The Remote-Control option:
      a) Enables un-tethered operator management of stop, start, forward, and reverse control of the power system.
      b) Grants and confirms access only to an authorized controller, denying operation by spurious signals;
   b. Terminates access shortly after completed operation, requiring re-approval to resume operation.
   c. Manufacturer shall provide and install Access Control Unit and Remote Controller and shall provide Remote Control Transmitters.

2.7 FABRICATION

A. Fabricate understructure from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.

B. Weld understructure to comply with applicable AWS standards.

C. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

D. Form exposed sheet metal with flat, flush surfaces, level and true in line, and without cracking and grain separation.

2.8 ACCESSORIES

A. Front Aisle Steps: At each vertical aisle location front aisle step. Front steps shall engage with front row to prevent accidental separation or movement. Provide four non-skid rubber feet each 1/2 inch (13 mm) in diameter. Full radius end caps on all four edges.
   1. Slip-resistant, abrasive tread nosings.

B. Intermediate Aisle Steps: Fully enclosed, at each vertical aisle. Full radius end caps on all four edges. Adhesive-backed abrasive non-slip tread surface.

C. Rear Wall Column Cutouts: 5 cuts per bank both banks A & B
   1. Provide custom bleacher cutouts at rear wall building columns. Top row(s) to be cut out and fitted to meet wall column conditions.

D. Fillers and Closures:

1. Top Row: Provide seat level rear filler panels to close openings between top row seat and wall; finish to match platforms.
2. Sides of Extended Units: Vinyl curtains.
3. Vinyl Curtains: 18 ounce (510 g) vinyl with grommets; color as selected from manufacturer's standard palette.

E. Motion Monitor: Strobe light and warning horn rated at 150 dB, both of which operate continuously during movement of any section of bleachers; mount strobe light where it is clearly visible to entire bleacher installation.

F. Scorer's Table: 8 feet (2.44 m) wide by 18 inches (450 mm) deep; relocatable to any row of any section without mounting brackets.

G. Semi-Permanent Modular Video Platform: 4 feet (1219 mm) by [4 feet (1219 mm) with safety rails.

H. Fasteners: Provide hardware and fasteners in accordance with manufacturer92s recommendations.

I. Anchorage: As indicated on drawings; provide hardware in accordance with manufacturer recommendations.

2.9 GRAPHICS

A. Bleacher Face Logo: Decorative school logo, of same design as the logo at the center of the gymnasium floor, applied to the vertical surface of the molded seats of the center of Bank B an visible when the bleacher are in the closed position

END OF SECTION

SPECIAL PURPOSE ROOMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Modular sound-isolation practice rooms.

1.3 RELATED SECTIONS

A. Section 08 3460 - Sound Rated Door and Frame Assembly.

B. Section 13 4800 - Sound, Vibration and Seismic Control.

C. 13 4823 - Concrete Sound Isolation Floor.

D. Division 22 for fire suppression sections for connection to building sprinkler system.

E. Section 26 0400 Sheetmetal Work And Related Accessories for ductwork sections for direct connection to building HVAC system.

F. Section 26 0400 Sheetmetal Work And Related Accessories for ductwork sections for direct connection to building HVAC system.

G. Section 26 0300 Wire And Cable for connection to building electrical system..

1.4 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. ASTM International (ASTM):
   1. ASTM A 1008 - Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   2. ASTM C 423- Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   4. ASTM E 90- Laboratory Measurement of Airborne Sound Transmission of Building Partitions.
   5. ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
   6. ASTM E 413 - Classification for Determination of Sound Transmission Class.

C. Builders Hardware Manufacturers Association (BHMA):
   1. ANSI/BHMA A156.2 - Bored and Preassembled Locks and Latches.

D. Code of Federal Regulations (CFR):
   1. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

E. Underwriters Laboratories, Inc. (UL):
   1. UL 723 - Test For Surface Burning Characteristics of Building Materials.
   2. NEC 2008 - National Electric Code.

1.5 DEFINITIONS

A. Noise Isolation Class (NIC): Single number rating used to describe noise reduction between two enclosed spaces that are acoustically connected, based upon ASTM E 596 and ASTM E 336.

B. Noise Criterion (NC): Single number rating used to describe background noise levels due to ventilation equipment, lighting, etc. per ASTM E336.

C. Sound Transmission Class (STC): Single number quantifier used to rate partitions, doors and windows for their effectiveness in blocking sound per ASTM E90.

1.6 SYSTEM DESCRIPTION

A. Sound-Isolation Practice Rooms: Factory-fabricated, modular, sound-isolation enclosures with sound transmission characteristics meeting requirements. Enclosures shall be internally wired for power, lighting, and ventilation controls. Site-fabricated enclosures and enclosures with site-installed gaskets and sealants shall not be allowed. Modifications to room on site affect acoustical performance and laboratory test data.
   1. Rooms shall be assembled from factory-gasketed modular components that allow reconfiguration and relocation without component modification or loss of acoustical performance.
   2. Interior Room Height: 8 feet 6 inches (2591 mm).

B. Room Variation: Sound-isolation practice rooms (upgradeable to VAE) shall be equipped with integrated and wiring, raceways, panel cutouts for speakers and microphones, all concealed within wall panels to allow room to be upgraded with the VAE technology system in the future. No external mounted wiring, raceways, speakers, or microphones allowed.

1.7 PERFORMANCE REQUIREMENTS

A. Airborne Noise Reduction: Sound-isolation practice rooms with 410 cu. ft. (11.6 cu. m) interior volume, 34 percent perforated interior panels, 12 inch (304 mm) airspace between modules, mounted on concrete floor construction, tested as follows:
   1. NIC 41 from exterior to interior of module, per independent lab test.
   2. NIC 63 from interior of one module to interior of adjacent module, with 12 inches (304 mm) airspace between modules, per independent lab test.

B. Ambient Noise at Center of sound-isolation room: Lighting and ventilating systems operating, per ANSI S 12.2: Not exceeding NC 25.

C. Reverberation Time: Sound-Isolation Practice Rooms with 640 cu. ft. (18.12 cu. m) interior volume: in contiguous octave bands, center frequencies from 125 to 4000 Hz, per ASTM C 423: 0.45 plus or minus 0.10 seconds.

D. Ventilation Air Change Rate: Sound-isolation practice rooms with 406 cu. ft. (11.5 cu. m) interior volume shall have 35 air changes per hour. Other rooms will vary according to size and occupancy.

E. Sound-Isolating Door Sound Transmission Class: With full window, per internal testing only: STC 46.

F. HVAC Ceiling Panel Sound Transmission Class: Per internal testing only: STC 45.

G. Safety Glazing Products: 16 CFR 1201.

H. Seismic Performance: Comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" based upon seismic design criteria indicated.

1.8 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets, installation instructions, and maintenance recommendations.

C. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency. Include certification of Listing and Labeling requirements and Fire Test Response Characteristics.

D. Shop Drawings: Prepared by manufacturer. Include elevations showing sound-isolation practice room components and details of each condition of installation. Show fabrication and installation details. Include plans, elevations, sections, details, and connections and attachments to other work.
   1. Indicate seismic bracing and fastening requirements.

E. Samples: For each color and finish for each exposed practice room component.

F. Operation and Maintenance Data.

G. Warranty: Submit manufacturer's standard warranty statement.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum 10 years experience in manufacture of sound-isolation practice rooms. Obtain sound-isolation practice rooms through one source from a single approved manufacturer.

B. Installer: Minimum 5 years experience in the installation of sound-isolation practice rooms and approved by the manufacturer.

C.

D. Fire-Test-Response Characteristics per ASTM E 84 or UL Standard 723: Flame spread index: 25 or less; Smoke developed index: 450 or less.

E. Safety Glass: Products complying with testing requirements in 16 CFR 1201 for Category II materials.

F. Electrical Components: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle components of sound-isolation practice rooms in accordance with manufacturer's recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units at recommended temperature and humidity levels maintained during the remainder of construction.

1.11 COORDINATION

A. Coordinate installation of concrete slab supporting sound-isolation practice rooms meeting the following flatness tolerance requirements:

1. The gap at any point between concrete surface and a 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
2. The elevation of the concrete slab around the perimeter of the room does not vary at any point by more than plus or minus 3/8 inch (8 mm) from level.

B. Coordinate installation and electrical rough-in components for connection to sound-isolation practice rooms.

C. Coordinate installation of HVAC and Fire Suppression and electrical rough-in components for connection to sound-isolation practice rooms.

1.12 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install practice rooms until spaces are enclosed and weather tight, wet work in spaces is complete and dry, HVAC system is operating and maintaining ambient temperature at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify field measurements, if required, as indicated on Shop Drawings. Where measurements are not possible, provide control dimensions and templates.

1. Coordinate installation and location of blocking and supports as requested.
2. Verify openings, clearances, storage requirements and other dimensions relevant to the installation and final application.

C. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.13 WARRANTY

A. Warranty: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of sound-isolation practice rooms that fail in materials or workmanship within 5 years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:

1. Fracturing or breaking of room components, including doors, panels, or hardware, that results from normal wear and tear and normal use other than vandalism.
2. Delamination or other failures of glue bond of components.

3. Warping of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
4. Failure of operating hardware.
5. Failure of acoustical gaskets and seals.
6. Failure of room to perform acoustically in accordance with manufacturer's published data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wenger Corporation, JR Clancy and GearBoss, which is located at: ; Owatonna, MN/Syracuse, NY, ; Toll Free Tel: (800) 4WENGER (493-6437); Tel: (507) 455-4100; Fax: (507) 455-4258; Email: request info (info@wengercorp.com)

B. Requests for substitutions will be considered in accordance with provisions of Section 01 2500 - Substitution Procedures and the following:
   1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
      a. Product data, including certified independent test data indicating compliance with requirements.
      b. Full-size samples of each component of product specified.
      c. Project references: Minimum of 5 installations not less than 5 years old, with owner contact information.
      d. List of successful installations of similar products available for evaluation by Architect.
      e. Sample warranty.
   2. Approved manufacturers shall meet separate requirements of Submittals.

2.2 MATERIALS

A. Steel Sheet: Cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B.

B. Sound Attenuation Material: ASTM C 665, Type I, 1.5-lb/cu. ft (24 kg/cu. m).

2.3 SOUND-ISOLATION PRACTICE ROOMS

A. All Wenger electrical components and wiring meet NFPA and NEC code requirements for listed and labeled assemblies and components.

B. General: Provide sound-isolation practice rooms meeting Contract Documents requirements.

C. Wall Frame: 14-gauge/0.075 inch (1.91 mm) thick steel channel with 1-1/4 inch (31.75 mm) thick factory-applied acoustical gasketing at floor slab, with 3/4 inch (19 mm) leveling adjustment.

D. Wall Panels: 30 inches by 4 inches (762 by 102 mm) thick composite panels, consisting of an exterior face of 16-gauge/0.0598 inch (1.52 mm) sheet steel, an interior face of 22-gauge/0.0299 inch (0.76 mm) perforated or solid sheet steel, with sound-attenuation material at panels indicated as perforated.
   1. Acoustical Seal: Two continuous acoustical gaskets factory-mounted at panel perimeter.
   2. Panel Attachment: Two or more mechanical locks on each vertical edge to align and engage adjoining panel and create compression seal between panels.
   3. Corner Assembly: Same construction as wall panels.
   4. Power Panel (one per unit): Same construction as wall panels, with factory pre-wiring meeting ETL and NEC requirements, consisting of conduit, wiring, junction and electrical boxes, and airtight cover plates, and including the following:
      a. Two duplex receptacles.
      b. Dimmable switches, occupancy sensors and connectors for lighting control (and fans, and VAE, as required).
      c. Three empty raceways for future Owner-installed circuitry.

E. Ceiling Frame: Sheet steel, 16-gauge/0.053 inch (1.34 mm) thick, with clamping mechanism for compressing ceiling panel acoustical gaskets, with external support beam where required by room size.

F. Ceiling Panels: Same construction as wall panels, 15 inches wide by 6 inches thick (381 mm wide by 152 mm thick), with the following characteristics:
   1. Acoustical Seal: Two continuous acoustical gaskets factory mounted at panel perimeter.
   2. Panel Attachment: Two mechanical locks on each vertical edge to align and engage adjoining panel and create compression seal between panels.
   3. Sprinkler Ceiling Panels: Where indicated, panels fabricated with predrilled holes to enable fire sprinkler system installation specified elsewhere. Furnish covers for installations not requiring sprinkler piping penetration.
   4. Light Panels: Where indicated, highly efficient, 50/60Hz, 100-277 Volt AC, 40 Watt, 1' x 4' dimmable edge-lit LED flat panels. Technical information; power factor: 0.9, lifetime (L70): 50,000 hours, LED chip type: 2835, number of LEDs (per panel): 216, physical dimensions: 11.83 inches (W) x 47.63 inches (L) x 0.39 inches (H), color temperature: 5000k (standard), lumens: 4200, beam angle: 120 degrees, RA value: 80, compatible with 0-10V dimmers. Compliance & approvals: ETL, FCC, DLC QPL, IP rating: damp locations.

G. Doors: 2 inches (51 mm) thick composite panel, consisting of an exterior face of 16-gauge/0.053 inch (1.34 mm) sheet steel, an interior face of 14-gauge/0.068 inch- (1.72 mm-) sheet steel, and a core of sound-attenuation material, sound transmission class (STC) 46 (based on internal testing), size and swing as indicated on Drawings, and as follows:
   1. Acoustical Seals: Magnetic seal plus compression seal at head and jambs, and adjustable sweep seal at door bottom.
   2. Hinge: Cam-type wrap around continuous barrel hinge, CR 1010 steel.
   3. Door size: 3 feet (914 mm) wide standard.
   4. Door Vision Lite: Nominal 22 by 66 inches (559 by 1676 mm), glazed with safety glass.
   5. Metal threshold: Stainless steel, 1/2 inch (12.7 mm) high.
   6. Lockset: ANSI/BHMA A156.2, Series 4000, Grade 1, cylindrical lock with lever handle, 6 pin cylinder, classroom function locking, satin nickel finish.
   7. Keying: Interchangeable core, with cylinder specified in Section 08 7100 - Door Hardware.

H. Ceiling Ventilation System, Connection to Building HVAC System:
   1. Vent Panels: 15 inch (381 mm) wide by 6-inch (152 mm) thick panel with integral acoustical air plenum, with 1-1/2 inch (38 mm) sound-absorbing duct liner and four 90-degree bends, with 8 inch (203 mm) diameter duct connector. Capacity: 120 cfm (.057 cu. m/s) maximum per vent panel. Configured in pairs of intake and exhaust panels as indicated. Flexible ductwork specified in mechanical section and provided by others.

2.4 FLOOR SYSTEM

A. Component System: Where indicated: Sheet vinyl flooring bonded to high density 1-1/8 inches (22 mm) thick particleboard, supported by steel under structure, with 1-1/2 inches (38 mm) sound-absorbing vibration isolators, supported on 6-1/4 Hz natural frequency vibration isolators with 1/4 inches (6 mm) maximum deflection under typical loading, joined by mechanical fasteners and aligned by interlocking steel support clips. Floor fabricated for installation inside finished practice room without disassembly of modules.

2.5 ACCESSORIES

A. Mirror: Mounts directly to interior solid wall panel. Metal mounting brackets in black painted finish are provided. Dimensions: 58 inches (1473 mm) high x 22 inches (559 mm) wide with 1/4 inch (6 mm) thick mirror glass, constructed with vinyl backing to prevent shattering of glass.

B. Drop-Down Technology Shelf: Mounts directly to interior solid wall panel for usage and storage of laptop computer. Shelf locks for secure storage of computer and all cables, wiring, etc. Constructed of metal

frame with maple wood shelf. Includes 6-outlet surge protector, with 15 feet (4572 mm) long cord. Drop-down shelf dimension: 30 inches (762 mm) wide x 15-1/2 inches (394 mm) deep. Overall dimensions (in locked position): 35 inches (889 mm) wide x 25 - 1/2 inches (648 mm) high x 7 - 1/4 inches (184 mm) deep.

C. Metronome/Tuner: Mounts directly to interior solid wall panel and houses battery-operated metronome/tuner, Korg model TM40. Mounting bracket included. Overall dimensions: 4-3/4 inches (121 mm) wide x 4- 3/4 inches (121 mm) high x 1 inch (25 mm) thick.

2.6 FINISHES

A. Electrical Cover Plates:
   1. Light, Fan and VAE Switch (as required): Satin chrome finish.
   2. All other: Painted to match wall panel colors.

B. Other Exposed Components: Iron phosphate pre-coat and thermo-set epoxy resin powder coat (baked) finish.
   1. Colors: Selected from manufacturers standards.
      a. Wall and ceiling panels: Oyster.
      b. Wall and ceiling panels: Warm Sand.
      c. Floor rail and door: Warm Beige.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine sound-isolation room installation areas for compliance with requirements for installation tolerances, including required overhead clearances and floor levelness, and other existing conditions affecting installation and performance of sound-isolating rooms. Proceed with room installation upon correction of unsatisfactory conditions.

3.2 SOUND-ISOLATING ROOM INSTALLATION

A. Install rooms under direct supervision of manufacturer.

B. Install rooms plumb, level, and true, using integral levelers. Install in accordance with manufacturer's instructions and approved submittals.

C. Install room components utilizing integral panel clamping mechanisms. Do not use sealants, fillers, loose insulation, or exposed fasteners.
   1. Install seismic bracing and fastening in accordance with approved shop drawings.

D. Do not modify panels or accessories in the field.

E. Do not fasten room frame to floor unless indicated on approved shop drawings in compliance with seismic design requirements.

F. Adjust rooms and hardware for doors to operate smoothly without warp or bind and close with uniform compression against flanges. Adjust sweep seals.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide field services consisting of supervision of the installation and inspection of the product.

B. Manufacturer's field services representative shall provided a written report approving the installation..

3.4 CLEANING

A. Repair or replace defective work as directed by Architect upon inspection.

B. Clean room surfaces. Touch up, refinish, or replace damaged components in a manner acceptable to Architect.

3.5 DEMONSTRATION

A. Refer to Section 01 7900 - Demonstration and Training.

B. Train Owner's personnel to adjust, operate, and maintain sound-isolation rooms.

C. Turn over keys and operation and maintenance instructions to Owner.

END OF SECTION

PREFABRICATED CANOPY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Work in this section includes furnishing and installation of:
   1. Extruded aluminum hanger rod supported canopies.

B. Related Items and Considerations
   1. Section 04 2000 - Unit Masonry.
   2. Section 07 6200 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

A. The following references shall be used:
   1. SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.) Architectural Sheet Metal Manual.
   2. NRCA (The National Roofing Contractors Association) Roofing and Waterproofing Manual (including Construction Details), Handbook of Accepted Roofing Knowledge, and Metal Roofing Details Guide.
   3. Manufacturer's Installation and Details Guide.

1.4 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide sheet metal roofing which has been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, and failure of infiltration of water.
   1. Conform to requirements of New York State Building Code and the following:
      a. Wind-Uplift: Roof panel assembly shall comply with UL 580 for UL 90 rated assemblies
      b. Static Air Infiltration: Completed roof system shall have a maximum of .06 cfm/sf with 6.24 kPa air pressure differential as per ASTM E1680.
      c. Water Infiltration: No evidence of water penetration at an inward static air pressure differential of not less than 6.24 psf (43 kPa) and not more than 12.0 psf (83 kPa) as per ASTM E1646.

B. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
   1. Fire/Windstorm Classification: Class 1A- 90.
   2. Hail Resistance: MH.

C. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
   1. Wind Loads: Determine loads based on the following minimum design wind pressures:
      a. Uniform pressure of 75 lbf/sq. ft., acting inward or outward.
   2. Snow Loads: 40 lbf/sq. ft..

D. Seismic Performance: Provide metal roof panel assemblies capable of withstanding the effects of earthquake motions determined according to "State of New York Building Code".

E. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other

detrimental effects. 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.

F. Calculation: Submit calculations, prepared by a Professional Engineer, registered in the State of New York, that structural components, fasteners and substrates are sufficient to withstand the design loads.

1.5 QUALITY ASSURANCE

A. Installer's Qualifications
   1. Installer must be approved by the canopy manufacturer in writing before work commencing.
   2. Installer shall successfully applied five metal canopies of comparable size and complexity that reflect a quality and weather tight installation.

B. Manufacturer's Qualifications
   1. Manufacturer shall have a minimum of ten (10) years experience supplying metal canopies to the region where the work is to be done.
   2. Comply with current independent testing and certification as specified.
   3. Manufacturer shall provide proof of liability insurance for their metal canopy system.

C. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in New York.

D. Professional Engineer Qualifications: A professional engineer who is legally authorized 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 projects with structural framing that are similar to that indicated for this Project in material, design, and extent.
   1. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections

E. Regulatory Agency Requirements
   1. Comply with New York Building Code requirements.

F. Basis of design: Products meeting these specifications and established standard of quality required as manufactured by Mapes Industries, Inc. Lincoln, Nebraska 1-800-228-2391.

1.6 SUBMITTALS

A. Product Data
   1. Submit manufacturer's technical product data, installation instructions and recommendations for the roofing. Include data substantiating that materials comply with requirements.

B. Samples
   1. Before ordering products, submit manufacturer's standard color samples for Architect's/Engineer's selection.

C. Shop Drawings
   1. Shop drawings are to be a small-scale layout of canopy plan and elevation, indicating the extent of work to be performed. Include sections of roof, fascia, and soffits, for each condition, detailing flashing and trim for different conditions, such as eaves, outside/inside corners, ridge, valleys, gutters, end wall terminations, closures, etc., showing a full and complete installation that comply with manufacturer's standard recommendations.
   2. Indicate all details that deviate from what is shown on the plans.
   3. Details to allow for expansion and contraction.
   4. Show attachment of panels and clips, spacing, type and number of fasteners, as recommended by the Manufacturer.
   5. For structural connections comply with design loads, include structural analysis data prepared by the qualified professional engineer, licensed in the State of New York responsible for their preparation.

1.7 PROJECT CONDITIONS

A. Examine the conditions and substrates in which metal roofing work is to be installed.

B. The contractor shall take field measurements of the structure and substrates indicated and specified to ensure that panel lengths and brake formed flashings are dimensioned accurately to facilitate easy installation.

C. Proceed with installation only after satisfactory conditions are met and all field conditions have been verified.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to provide all labor and material required to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including rupturing, cracking, or puncturing.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Unload and store materials at job site to protect them from any damage and discoloration. Follow Manufacturer’s material handling information, especially regarding long panel lengths.

B. Inspect delivered materials immediately. Prevent any interference with other trades or other adverse work conditions.

C. Handle panels with non-marring slings.

D. Do not bend panels.

E. Store panels on skids above ground, with one end elevated for drainage.

F. Protect material with waterproof covering and allow for sufficient ventilation to prevent condensation build up or moisture entrapment in the materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis of Design: Mapes Industries, Inc., Lincoln, Nebraska, Phone: 1-800-228-2391, Fax: 1-800-737-6756.
   1. “Super Lumideck®” Hanger Rod Canopy

2.2 MATERIALS

A. Decking, beams, posts and fascia shall be extruded aluminum, alloy 6063-T6, in profile and thickness required to meet design criteria.

B. Decking and fascia shall be extruded aluminum, alloy 6063-T6, in profile and thickness required to meet design criteria and as recommended by the manufacturer.
   1. 2 ¾” Extruded .078 Decking

2. Hanger rods and attachment hardware shall be galvanized/zinc plated, field painted to match canopy..
3. Fascia shall be standard 8" extruded "J" style (minimum .125 aluminum)

2.3 FINISHES

A. Provide two (2) coat Fluoropolymer 70% Kynar baked on, electrostatically applied enamel coating. Color to be selected from manufacturer's standard colors custom non-exotic color as selected by the Architect, applied over manufacturer's standard substrate preparation including cleaning, degreasing, and chromate conversion coating. Finish shall meet or exceed AAMA 2605.
1. Color: As selected by Architect

2.4 FABRICATION

A. Support columns and gutter beams shall be designed such that the columns will be notched to create a "saddle" that will receive and secure the gutter beams.

B. Post and beams shall be mechanically assembled utilizing 3/16" fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.

C. Decking shall be designed with interlocking extruded aluminum members with mechanical fasteners field applied to provide structural integrity for the completed assembly.

D. Concealed drainage. Water shall drain from covered surfaces into integral gutter beam and be directed to ground level discharge via one or more designated support posts.

PART 3 - EXECUTION

3.1 INSPECTION

A. Confirm that surrounding area is ready for the canopy installation.

B. Provide a written report of discrepancies or variations in the substrate to the Architect.

C. Do not begin installation until unsatisfactory conditions are corrected.

D. Do not proceed with installation until adjoining areas scheduled for finishing have been completed and washed down. Do not wash down acid residues from masonry or stucco directly over the metal panels.

E. Installer shall confirm dimensions and elevations to be as shown on Approved shop drawings.

F. Erection shall be scheduled after all concrete, masonry and roofing in the area is completed

3.2 INSTALLATION

A. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection.

B. After installation, entire system shall be left in a clean condition.

3.3 CLEAN UP

A. Surface Damage and Finish Scratches: Do not apply touch-up paint to damaged paint areas that involve minor scratches.
1. Components that have severe paint and/or substrate damage shall be replaced as directed by the Architect's or Owner's representative.

B. Cleaning and Repairing: At completion of each day's work and at work completion, clean surfaces, flashing and gutters. Do not allow fasteners, cuttings, filings or scraps to accumulate.
1. Complete all items on punch list.
2. Remove debris from project site upon work completion or sooner, if directed.

END OF SECTION

SOUND, VIBRATION AND SEISMIC CONTROL

PART 1 GENERAL:

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED:

A. Furnish all labor, materials, tools, and equipment; and, perform all operations necessary for the complete execution of the installation of Kinetics Noise Control, Inc. (Kinetics) RIM (2") System as shown on contract drawings and/or indicated in contract documents.

B. Related work shall include but not be limited to:
   1. Floor drains.

1.3

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete and concrete reinforcing.

C. Section 07 2100 - Thermal Insulation: Sound absorption materials used as cavity fill

D. Section 07 8400 - Firestopping: Firestopping sealants.

E. Section 07 9200 - Joint Sealants. Pipe, conduit, ductwork packing penetrations.

F. Section08 8001 - Glazing: Glazing sealants and accessories.

G. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

H. Sections 13 4813 - Sound Isolation Ceiling.

I. Section 13 4823 - Concrete Sound Isolation Floor:

1.4 SYSTEM DESCRIPTION

A. Flat, smooth structural surface, cleared of debris and broom swept; and, any required waterproofing properly installed;

B. Kinetics Perimeter & Penetration Interface (PPI) material with removable tear strip shall be attached using Kinetics spray adhesive at perimeter(s) e.g., curb, wall, formwork, and around any protrusions penetrating through isolated floor e.g., duct and pipe;

C. Kinetics RIM (2") System (factory assembled), consisting of pre-punched fiber glass batt insulation, 1-1/2" thick, and Kinetics KIP (2") fiber glass isolators; system designed to create a 2-inch (2") airspace (nominal)

D. Pouring form, minimum 1/2"-thick, C-grade, sheathing, EXP-1, fir, 4-ply plywood, interconnected with Kinetics Junction Plates, and covered with Kinetics poly sheeting, overlapped and taped at seams, and extended over top of perimeter isolation material;

E. Isolated concrete slab as indicated on drawings.

F. Kinetics perimeter sealant seals perimeter isolation material at tear strip cavity.

1.5 QUALITY ASSURANCE:

A. The components shall be supplied by a nationally recognized manufacturer having a minimum of five (5) years experience furnishing similar systems.

B. System shall be engineered and fabricated by manufacturer.

C. Fiber glass isolators shall be resistant to oil, water, acids, and fungus. Isolators shall be capable of sustaining a 100% overload without damage, permanent set, collapse, or permanent loss in specified natural frequency. Isolators shall perform properly for the life of the installation.

D. Pre-installation Conference: Shall be scheduled with Construction Manager to review installation procedures; conference can be conducted via Internet/telephone conference call or at project site (as directed by Construction Manager).

E. System shall be installed by contractor either under direction from or by authorization of manufacturer or their qualified agent.

F. Isolation materials shall not be installed during inclement weather when areas receiving same are temporarily exposed to the weather. Appropriate measures shall be taken to ensure work area remains dry during and after installation.

1.6 SUBMITTALS:

A. Shop Drawings: Acoustical Manufacturer shall prepare submittal drawings that include layout, section, and transition details, load conditions, isolator natural frequency and load deflection curves, and construction sequence. Contractor shall transmit submittal package to the Architect and Construction Manager for approval.

B. Isolator Selection: Bearing surface area and spacing of each isolator shall be determined by Acoustical Manufacturer on the basis of final evaluation of concentrated and uniformly imposed loads supplied to Acoustical Manufacturer by the Architect. At maximum acoustical design load, isolator shall maintain an essentially constant natural frequency of 15 Hz or lower (within 2 Hz over entire load range of floor system) and uniform deflection of the floating floor.

1. Substitute isolator must perform equally to fiber glass isolators specified system as installed and tested in the specific composite reported in NRC-CNRC Client Report B-3448.10. Test reports from laboratories other than NRC-CNRC are unacceptable unless reviewed and accepted for performance variances by Architect.
2. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 2500 - Substitution Procedures.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Deliver and store materials in manufacturer's original and unopened packaging with product nomenclature clearly marked on the package(s).

PART 2 PRODUCTS:

2.1 MATERIALS:

A. Kinetics RIM (2”) System (supplied by) Kinetics Noise Control, Inc., Dublin, Ohio:

1. RIM System (2”).
2. PPI Perimeter & Penetration Interface (3/4” thick).
3. Spray adhesive.
4. Junction Plates.
5. Poly sheeting and seam tape.
6. Perimeter sealant.

B. Plywood pouring form (3/4”-thick minimum, 4-ply). Pouring form shall not be anchored to RIM System KIP isolators or PPI perimeter isolation material.

C. Concrete and concrete reinforcement per Section 03 3000 - Cast-in-Place Concrete.

PART 3 EXECUTION:

3.1 INSTALLATION:

A. Installation of all sound isolation materials specified herein shall be accomplished following Kinetics's and/or the Design Team’s written instructions. Installation instructions shall be submitted to the Design Team for approval prior to beginning of work.

B. The installing contractor shall carefully examine conditions at the job site before commencing specified work. Any surfaces not properly prepared to receive work of this section shall be reported to the Design Team's representative and work shall not commence until conditions are satisfactory.

C. All isolation materials installed in areas exposed to the weather shall be temporarily protected by 6 mil polyethylene film covering until permanent waterproofing is achieved. The work shall be protected at the end of each day's work.

END OF SECTION

SOUND ISOLATION CEILING

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Sound isolation of gypsum wallboard ceilings by means of isolation components as shown on the drawings and specified herein.

1.3 DESCRIPTION OF WORK

A. Furnish all sound isolation materials necessary for the complete execution of the sound isolation system as shown, detailed, and / or scheduled on the drawings, and / or specified herein. This work shall include, but not necessarily be limited to, the following:
   1. Resilient isolation hangers.
   2. Perimeter Isolation material.

1.4 RELATED WORK

A. Section 09 2116 - Gypsum Board Assemblies: Construction and supports for gypsum board assemblies.

B. Section 09 5100 - Acoustical Ceilings .

1.5 SYSTEM DESIGN

A. The isolation materials supplier shall be responsible for the design of the sound isolation system.

B. The isolation system shall be designed to accommodate the loads of suspended ceiling components.

1.6 QUALITY ASSURANCE

A. The isolation components shall be supplied by a nationally recognized manufacturer having a minimum of five (5) years experience furnishing similar systems.

B. The installation contractor shall be experienced in the installation of systems specified herein and shall evidence such qualification by submitting to the Architect a list of five (5) previously installed similar sound isolation systems that performed satisfactorily to the building owner, or a letter of certification from the sound isolation system supplier that the installation contractor is familiar with the special requirements of the system.

C. **Pre-construction Meeting: The installation contractor shall arrange a pre-construction meeting with the Architect or Construction Manager and project acoustical consultant to review the scope of work and address any questions.**

1.7 SUBMITTALS

A. Samples of all sound isolation materials and components.

B. Detailed product drawings and load and deflection curves of all isolators.

C. A drawing or drawings showing:
   1. Ceiling suspension loads.
   2. Isolator sizes, deflections, frequencies, and locations.
   3. Caulking details.

PART 2 PRODUCTS

2.1 ISOLATION MATERIALS SUPPLIERS

A. Subject to requirements specified herein:
   1. Kinetics Noise Control, Inc. Or equal by:
      a. Mason Industries, Inc.
      b. Vibration Mountings and Controls, Inc.

2. Substitution: Refer to Section 01 2500 - Substitution Procedures.

2.2 MATERIALS

A. The isolation hanger shall be a combination high-deflection steel spring in series with a resilient, molded neoprene noise and vibration isolation pad. The steel spring and neoprene pad shall be incorporated into a stamped steel hanger assembly that resiliently supports the isolated ceiling.

B. The hanger assembly bracket shall be designed to allow fifteen (15) degrees of vertical alignment of the suspension member without making metal-to-metal contact between the suspension and hanger assembly members. The hanger bracket shall be designed with an integral spring pre-load bracket selected to minimize change in elevation once a load is applied to the hanger and to hold the isolator assembly steady during attachment of gypsum board. The hanger assembly bracket shall consist of a leveling rod with an attached channel carrier designed to accept 1-1/2" x 1/2", 16-gauge cold-rolled steel. The isolation hanger deflection shall be selected by the manufacturer to provide a maximum natural frequency of 4.4 Hz. The steel spring element shall have a minimum Kx to Ky of 1 at its 1" rated deflection.

C. Resiliently suspended ceilings shall be separated where non-isolated building components abut. Isolation material shall be 3/8" thick perimeter isolation board of closed cell polyethylene or fiberglass material. Perimeter isolation board shall not be penetrated by nail, screw, or similar fastener. Perimeter isolation board shall be adhered to non-isolated structure. Resiliently-suspended ceiling shall be constructed perimeter isolation board. Perimeter isolation board shall be sealed using resilient, non-hardening caulk.

PART 3 EXECUTION

3.1 INSTALLATION

A. The installation of all sound isolation materials specified herein, including those installed under other sections of the specifications, shall be in accordance with procedures submitted by the isolation material manufacturer and approved by the Architect.

B. All building components supported by the isolation hangers shall be free from rigid contact with any part of the non-isolated building structure to prevent unwanted sound flank

3.2 INSPECTIONS

A. Notification shall be given by the contractor to the Construction Manager and to the field representative of the isolation material supplier to inspect installation at the following stages:

1. Upon completion of all areas prior to placement of isolation materials. All surfaces shall receive their approval prior to installation of the isolation material.
2. Upon completion of placement of the isolation materials and framing.
3. Upon completion of the isolation ceiling. Any evidence of faulty performance shall be evaluated and such imperfections corrected. Any area subject to short circuiting shall be cut out and properly installed to ensure satisfactory sound isolation performance.

END OF SECTION

CONCRETE SOUND ISOLATION FLOOR

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Isolation of concrete floors from building structure by means of isolation materials under plywood panels and perimeter isolation material as shown on the drawings and specified herein.

1.3 DESCRIPTION OF WORK

A. Furnish all labor, materials, tools, appliances, equipment, and perform all operations necessary for the complete execution of the sound isolation system as shown, detailed, and / or scheduled on the drawings, and / or specified herein. This work shall include, but not necessarily be limited to, the following:

1. Support of concrete slabs by sound isolation materials.
2. Isolation of concrete slabs from adjoining construction by means of perimeter isolation board.

1.4 RELATED WORK

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete and concrete reinforcing.

C. Section 07 2100 - Thermal Insulation: Sound absorption materials used as cavity fill

D. Section 07 9200 - Joint Sealants. Pipe, conduit, ductwork packing penetrations.

1.5 SYSTEM DESIGN

A. The isolation materials supplier shall be responsible for the design of the load bearing sound isolation material, and shall provide a complete sound isolation system to the installation contractor.

B. The isolation system shall be designed to accommodate the range of uniform dead and live loads, and concentrated loads of furnishings and / or equipment supported by the isolated floor.

C. A complete set of final approved shop drawings of all items to be supported by the isolated floor shall be furnished to the isolation material supplier, on which the design of the load bearing floor system will be based.

1.6 QUALITY ASSURANCE

A. The isolated floor system shall be designed and fabricated at the facilities of a nationally recognized manufacturer having a minimum of five years' experience furnishing similar systems.

B. The system shall be installed under the supervision of the isolation system manufacturer.

C. The installation contractor shall be experienced in the installation of systems specified herein and shall evidence such qualification by submitting to the Architect a list of five (5) previously installed similar sound isolation systems that performed satisfactorily to the building owner, or a letter of certification from the sound isolation system supplier that the installation contractor is familiar with the special requirements of the system.

D. **Pre-construction Meeting: The installation contractor shall arrange a pre-construction meeting with the Architect or Construction Manager and project acoustical consultant to review the scope of work and address any questions.**

1.7 SUBMITTALS

A. Samples of all sound isolation materials and components.

B. Detailed product drawings and load and deflection curves of all isolators.

C. A drawing or drawings showing:

1. Dead, live, and concentrated loads.
2. Isolator sizes, deflections, frequencies, and locations.
3. Any penetration locations.
4. Size, type, elevation, and placement of any concrete reinforcing.
5. Caulking details.
6. Isolated floor construction procedures.

PART 2 PRODUCTS

2.1 MATERIALS

A. The isolated floor system shall consist of heavy aggregate 150 PCF concrete slab of minimum 4 in. thickness, the isolation materials, and the supporting floor structure.

B. Isolation materials shall consist of minimum 3/4 in. thick exterior grade plywood supported by either 2 in. thick pre-compressed molded fiberglass pads or 2 in. thick cylindrical neoprene mountings.

C. The characteristics of the isolation materials and the bearing surface and spacing of each isolator shall be determined by the isolation material supplier on the basis of final evaluation of concentrated and uniformly imposed loads so as to maintain a constant natural frequency of 15 Hz. or lower and uniform deflection of the isolated floor.

D. Junction plates shall be provided to maintain planar alignment of the plywood isolation panels. Plates shall be 4 in. x 4 in. 16 ga. galvanized steel attached at four points using power driven screws.

E. Perimeter isolation board shall be minimum 3/4 in. thick closed cell expanded polyethylene or fiberglass material.

2.2 ISOLATION MATERIALS SUPPLIERS

A. Subject to requirements specified herein:
   1. Kinetics Noise Control, Inc. Or approved equal:
      a. Mason Industries, Inc.
      b. Vibration Mountings and Controls, Inc.
   2. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 2500 - Substitution Procedures.

PART 3 EXECUTION

3.1 INSTALLATION

A. The installation of all sound isolation materials specified herein shall be in accordance with procedures submitted by the isolation material manufacturer and approved by the Architect.

B. Installation Sequence:
   1. Install perimeter isolation board.
   2. Place isolators and formwork in accordance with approved shop drawings.
   3. Install junction plates.
   4. Report for correction any deficiencies which may prove detrimental to the performance of the system prior to concrete pour.
   5. Supervise the concrete pour (by others) to ensure the formwork or any other component of the system is not disturbed.
   6. Install perimeter caulking once the concrete has cured.

C. All sound isolation materials and building components supported by isolation materials are to be completely free from rigid contact with any part of the building structure.

3.2 INSPECTIONS

A. Notification shall be given by the contractor to the Construction Manager and representative of the isolation material supplier to inspect installation at the following stages:

1. Upon completion of all areas prior to placement of isolation materials. All surfaces shall receive their approval prior to installation of the isolation material.
2. Upon completion of placement of the isolation materials and prior to placement of concrete.
3. Upon completion of the finished floor surface. Any evidence of faulty performance shall be evaluated and such imperfections corrected. Any area subject to short circuiting shall be cut out and properly installed to ensure satisfactory sound isolation performance.

END OF SECTION

ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Complete electric traction elevator systems.
   1. Passenger type.
   2. Machine-Room Less.

B. Elevator Maintenance.

1.3 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls

B. Section 01 7000 - Execution.

C. Section 03 3000 - Cast-in-Place Concrete: Includes elevator machine foundation, elevator pit, overhead hoist beams, and grouting thresholds.

D. Section 04 2000 - Unit Masonry: Masonry hoistway enclosure; building-in masonry lintel hoistway door frames.

E. Section 05 1200 - Structural Steel Framing: Includes overhead hoist beams.

F. Section 05 5000 - Metal Fabrications: Includes elevator pit ladder, sill supports, divider beams, overhead hoist beams, and sump pit cover..

G. Section 07 1300 - Sheet Waterproofing: Waterproofing of elevator pit walls and floor.

H. Section 08 7100 - Finish Hardware: Product requirements for key cylinders provided by this section.

I. Section 08 9100 - Louvers. For louvers used in hoistway venting.

J. Section 09 6500 - Resilient Flooring: Floor finish in car.

K. Section 23 0300 Fans: Ventilation and temperature control of elevator equipment room.

L. Division 26 Electrical: Conduit, power, fire alarm, wiring, smoke detectors and telephone.

1.4 REFERENCE STANDARDS

A. Refer to Section 01 4100 - Regulatory Requirements.

B. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

D. ADAAG, Americans with Disabilities Act Accessibility Guidelines.

E. ANSI/NFPA 70, National Electrical Code

F. ANSI/NFPA 80, Fire Doors and Windows,

G. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.

H. ASME/ANSI A17.7, Safety Code for Elevators and Escalators

I. ASME A17.1 - Safety Code for Elevators and Escalators; 2016.

J. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; 2014.

K. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2013.

L. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

M. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

N. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

O. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.

P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

Q. ITS (DIR) - Directory of Listed Products; current edition.

R. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

S. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

T. ANSI/UL 10B, Fire Tests of Door Assemblies.

U. EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity.

V. UL (DIR) - Online Certifications Directory; Current Edition.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other installers to provide necessary conduits for proper installation of wiring, including but not limited to, the following:
      a. Telephone service from controller cabinet.
      b. Elevator pit for lighting and sump pump.
      c. Fire alarm panel from controller cabinet.

B. Preinstallation Meeting: Convene meeting at least two (2) weeks prior to start of this work.
   1. Review schedule of installation, proper procedures and conditions, and coordination with related work.
   2. Review use of elevator for construction purposes, hours of use, scheduling of use, cleanliness of car, employment of operator, and maintenance of system.

C. Construction Use of Elevator: Not permitted.

1.6 SYSTEM DESCRIPTION

A. Equipment Description: Gearless traction elevator

B. Equipment Control: Electronic Control System.

C. Drive: Regenerative

D. Quantity of Elevators: 1

E. Elevator Stop Designations: Front Only At 1, 2, 3.

F. Stops : 3

G. Openings: Front.

H. Travel: 49"- 2".

I. Rated Capacity: 2100 lbs Passenger

J. Rated Speed: 150 fpm

K. Platform Size: 5’ 9-1/2” wide x 4’ 11-1/8” deep

L. Clear Inside Dimensions:
   1. 5'- 8-5/16" wide x 4' -3-9/16" deep.

M. Clear Cab Height: 9'-9”.

N. Entrance Type and Width: One Speed Side Slide 36” doors

O. Entrance Height: 84”

P. Main Power Supply: 208 Volts + or - 5% of normal, three-Phase, 60 Hz with a separate equipment grounding conductor.

Q. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.

R. Signal Fixtures: Manufacturer’s standard with metal vandal proof button targets

S. Controller Location: Controller(s) shall be located in the machine room.

T. Performance:
1. Car Speed: + 3 % of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold up to 120% of rated load. (code required).

U. Ride Quality:
1. Vertical Vibration (maximum): 20 milli-g
2. Horizontal Vibration (maximum): 12 milli-g
3. Vertical Jerk (maximum): 4.59 ± 1.0 ft./ sec3 (1.4 ± 0.3 m/ sec3)
4. Acceleration/Deceleration (maximum): 2.62 ft./ sec2 (0.8 m/ sec2)
5. In Car Noise: 55 - 60 dB(A)
6. Stopping Accuracy:: ± 0.375 in. (± 10 mm) max, ± 0.25 in. (± 6 mm) Typical
7. Re-leveling Distance: ± 0.5 in. (± 12 mm)

V. Simplex Collective Operation:

W. Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
1. Operating Features - Standard
a. Full Collective Operation
b. Anti-nuisance.
c. Fan and Light Protection.
d. Load Weighing Bypass.
e. Firefighters' Service Phase I and Phase II:
f. Top of Car Inspection.

X. Door Control Features:
1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
3. Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
4. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.
5. Provide equipment according to: Seismic Zone 2.

Y. One set of protective cab wall pads with hooks.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on following items:
1. Signal and operating fixtures, operating panels, and indicators.
2. Car design, dimensions, layout, and components.
3. Car and hoistway door and frame details.
4. Electrical characteristics and connection requirements.

C. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
   1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
   2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
   3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
   4. Individual weight of principal components; load reaction at points of support.
   5. Loads on hoisting beams.
   6. Clearances and over-travel of car and counterweight.
   7. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.
   8. Location and sizes of hoistway and car doors and frames.
   9. Calculated heat dissipation of elevator equipment in machine room.
   10. Electrical characteristics and connection requirements.
   11. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets or finish color selection brochures.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

G. Testing Agency's Qualification Statement.

H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

I. Maintenance schedule for two year warranty period.

J. Operation and Maintenance Data:
   1. Operation and maintenance manual.
   2. Schematic drawings of equipment, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.8 QUALITY ASSURANCE

A. Designer Qualifications: Design guide rails under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in New York.

B. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized representatives

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
   1. Elevator manufacturer shall be ISO 9001 certified.

D. Installer Qualifications: Supervisor along with trained elevator installation personnel on staff of elevator equipment manufacturer.
   1. Approved Installer: Otis Elevator Company – Contact Jonathan Shankman, jonathan.shankman@otis, or (914) 375-7809

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

F. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR) or UL (DIR).

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.9 NON-PROPRIETARY EQUIPMENT

A. Equipment and component parts installed, supplied or provided under this contract shall be manufactured and distributed by a third-party, non-installer company regularly engaged in serving the elevator industry.

B. Equipment and component systems shall not employ any proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance, repairs or adjustments by all qualified contractors.

C. Manufacturer's of apparatus shall provide parts replacements on open market to all maintenance providers for equipment and component systems for as long as said parts are available to ensure apparatus or systems remain maintainable regardless of who may be selected for future service. Prior to final acceptance complete parts manuals for all major and minor component parts shall be provided.

D. Prior to final acceptance a complete set of as-built, "adjustor-level" wiring diagrams shall be provided to the Owner along with any nomenclature documents.

E. Manufacturer shall, if not maintaining the equipment, promptly notify Owner of any safety bulletins affecting said microprocessor-based control systems of which Owner or Owner's agent should take action.

F. Prior to final acceptance, Owner or Owner's representative reserve the right to accept or reject materials submitted in compliance of these paragraphs, Contractor shall have thirty (30) days to resubmit for approval, replacements for any items rejected.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty for elevator operating equipment and devices for two (2) years from Date of Substantial Completion.

1. 24 months after acceptance of elevator by owner including maintenance and emergency callback service during normal working hours

1.11 MAINTENANCE AND SERVICECONTRACT

A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 24 months after the elevator has been turned over for the customer’s use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

1.12 MAINTENANCE AND SERVICE EQUIPMENT REQUIREMENTS

A. The periodic lubrication of elevator components shall not be required, including: Sheaves, Rails, Belts, Ropes, Car and CWT guides, etc.

B. The elevator control system must:

1. Provide in the controller the necessary devices to run the elevator in inspection operation.
2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
4. Provide in the event of a power outage, means from the controller to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.

6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.

C. Provide the means from the controller to reset elevator earthquake operation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design - Electric Traction Elevators: Gen2™ traction passenger elevators as manufactured BY Otis Elevator Company; including control system and car design.

B. Substitutions: See Section 01 2500 Substitution Procedures.

C. Source Limitations: Provide elevator and associated equipment and components produced by the same manufacturer as the other elevator equipment used for this project and obtained from a single supplier.

2.2 ELECTRIC TRACTION ELEVATORS

A. Electric Traction Passenger Elevator:
   1. Equipment:
      a. An AC gearless machine using embedded permanent magnets mounted at the top of the hoistway.
      b. Polyurethane Coated-Steel Belts for elevator hoisting purposes.
      c. Regenerative drive that captures normally wasted energy and feeds clean power back into the building's power grid.
      d. LED lighting standard in ceiling lights and elevator fixtures.
      e. Sleep mode operation for LED ceiling lights and car fan
   2. Drive System:
      a. Variable voltage alternating current (AC).

B. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.
   1. All high voltage (110V or above) contact points inside the controller shall be protected from accidental contact when the controller doors are open.
   2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
   3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC.
   4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 - immunity"
   5. A separate control room or cabinet shall not be required.

C. Machine and Governor
   1. Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.
   2. Governor: The governor shall be a tension type car-mounted governor.
   3. Buffers, Car and Counterweight: Polyurethane type buffers shall be used.
   4. Hoistway Operating Devices:
      a. Emergency stop switch in the pit
      b. Terminal stopping switches.
   5. Positioning System: Consists of an encoder, reader box, and door zone vanes.
   6. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.

7. Coated-Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords and a flat profile on the running surface and the backside of the belt. All driving sheaves and deflector sheaves should have a crowned profile to ensure center tracking of the belts. A continuous 24/7 monitoring system using resistance based technology has to be installed to continuously monitor the integrity of the coated steel belts and provide advanced notice of belt wear.
8. Governor Rope: Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core center.
9. Fascia: Galvanized sheet steel shall be provided at the front, and rear, of the hoistway

2.3 HOISTWAY ENTRANCES:

A. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.

B. Sills shall be extruded aluminum.

C. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.

D. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour.

E. Entrance Finish
1. Stainless Steel.

F. Frame Finish
1. Stainless Steel.

G. Entrance marking plates: Entrance jambs shall be marked with 4” x 4” (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
1. Sight Guards: Black sight guards will be furnished with all doors

2.4 CAR COMPONENTS

A. Carframe and Safety: A carframe fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the carframe and shall be Type "B", flexible guide clamp type.

B. Cab Finish:
1. Steel shell cab with raised stainless steel, vertical panels.
2. Black vertical trim pieces
3. Paints and laminate to be selected from manufacturer’s catalog of choices.
4. Brushed Stainless Steel finished base plate located at top and bottom

C. Car Front Finish: Satin Stainless Steel.

D. Car Door Finish: Satin Stainless Steel.

E. Ceiling Type: Brushed Steel Finish (BSF) Flush Metal Ceiling with 4 LED lights

F. Flooring: Resilient tile flooring as specified in Section 09 6500.

G. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.

H. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A key switch shall be provided in the car-operating panel to control the fan.

I. Handrails: Handrails shall be provided on the Side & Rear walls of the car enclosure. Handrails shall be 3/8”x 2” (9.5mm x 51mm) Flat Tubular handrail with a Brushed Steel Finish

J. Threshold: Extruded Aluminum

K. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

L. Guides: The car shall have 3" diameter roller guides at top and bottom and the counterweight shall have slide type guides at the top and the bottom.

M. Platform: The car platform shall be constructed of metal. Load weighing device shall be mounted on the belts at the top of the hoistway.

N. Zoned Certificate frame- Provide a Certificate frame with a satin stainless steel finish.

O. Protection Blanket: Provide mounting buttons and 1 complete set of cab protection blankets

2.5 SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.

B. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with these options:
   1. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel
   2. The car operating panel shall be equipped with the following features:
      a. Raised markings and Braille to the left hand side of each push-button.
      b. Car Position Indicator at the top of and integral to the car operating panel.
      c. Floor selection buttons with individual keyed lockout of each floor.
         a) Provide key cylinder cores and keys to match owners master key system as specified in section 08 7100.
      d. Door open and door close buttons.
      e. Inspection key-switch.
      f. Elevator Data Plate marked with elevator capacity and car number.
      g. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
      h. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
      i. In car stop switch (toggle or key unless local code prohibits use)
      j. Firefighter's hat.
      k. Firefighter's Phase II Key-switch
      l. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.
      m. Call Cancel Button
   3. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Hall fixtures shall feature:
   1. Keyswitch and Hall Button all floors.
   2. Integral Hall fixtures shall feature:
      a. Round stainless steel, mechanical buttons marked to correspond to the landings.
      b. Hall fixtures to be located in the entrance frame face. Therefore, separate wiring and installation of electrical boxes inside the wall for the hall buttons are not required.
      c. Buttons shall be in vertically mounted fixture. Fixture shall be satin stainless steel finish.
      d. Vandal-Resistant, mechanical buttons marked to correspond to the landings, flush satin stainless steel button with blue LED illuminating center jewel.

a) Access key-switch at each floor.
b) Provide key cylinder cores and keys to match owners master key system as specified in section 08 7100.

D. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

2.6 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Conform to ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Conform to ADA Standards.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.

D. Perform welding of steel in accordance with AWS D1.1/D1.1M.

E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.

F. Perform electrical work in accordance with NFPA 70.

2.7 EMERGENCY POWER

A. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.
1. Provide internal battery power to allow elevator to return to level of exit discharge and for hoistway and cab doors to open.

B. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

2.8 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.

B. Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel), with matte finish.

C. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.

D. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

E. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

F. Resilient Flooring: Vinyl tile flooring, as specified in Section 09 6500.

G. Plastic Laminate: NEMA LD 3, Type HGS, color as selected by Fuller and D'Angelo P.C. from manufacturer's standard line of colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway, pit, and machine room are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.2 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components. Conform to requirements of Section 01 5000 - Temporary Facilities and Controls.

B. Maintain elevator pit excavation free of water.

3.3 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories. Refer to Sections 26 0533.13 and 26 0583.

D. Mount machines and motors on vibration and acoustic isolators.
   1. Place on structural supports and bearing plates.
   2. Securely fasten to building supports.
   3. Prevent lateral displacement.

E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

F. Install guide rails to allow for expansion and contraction movement of guide rails.

G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

H. Bolt or weld brackets directly to structural steel hoistway framing or inserts incorporated into masonry or concrete construction.

I. Field Welds: Chip and clean away oxidation and residue with wire brush; spot prime with two coats.

J. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

K. Fill hoistway door frames solid with grout in accordance with Section 04 2000.

L. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime with two coats.

M. Adjust equipment for smooth and quiet operation.

3.4 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Contractor shall provide testing and inspections certified in accordance with ASME QEI-1 .
   1. Schedule tests with agencies and notify Port Chester-Rye UFSD and Fuller and D'Angelo P.C..
   2. Document regulatory agency tests and inspections in accordance with requirements.
   3. Perform tests required by regulatory agencies.
   4. Furnish test and approval certificates issued by authorities having jurisdiction.

C. Perform testing and inspection in accordance with requirements.
   1. Inspectors shall be certified in accordance with ASME QEI-1.
   2. Perform tests in accordance with ASME A17.2.
   3. Provide at least two weeks written notice of date and time of tests and inspections.
   4. Supply instruments and execute specific tests.

D. Operational Tests:
   1. Perform operational tests in the presence of Port Chester-Rye UFSD and Fuller and D'Angelo P.C..
   2. Provide load test in accordance with NYS Building code.
   3. Test single elevator system by transporting at least four (4) persons up from main floor to top floor landings during a five minute period.

4. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.
    a. Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.

3.6 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch (6.4 mm) maximum from flush with sill.

3.7 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components in accordance with manufacturers written instructions.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstrate proper operation of equipment to Port Chester-Rye UFSD's designated representative.

D. Training: Train Port Chester-Rye UFSD's personnel on cleaning and operation and maintenance of system.
    1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
    2. Provide minimum of two hours of training.
    3. Instructor: Manufacturer's training personnel.
    4. Location: At project site, unless otherwise indicated.

3.9 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch-up, repair, or replace damaged products and materials before Date of Substantial Completion.

3.10 MAINTENANCE

A. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 24 Months from Date of Substantial Completion.

B. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or installer.

C. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Port Chester-Rye UFSD.

D. Examine system components periodically.

E. Include systematic examination, adjustment, and lubrication of elevator equipment.

F. Maintain and repair or replace parts, whenever required, using parts produced by original equipment manufacturer.

G. Perform work without removing cars from use during peak traffic periods.

H. Provide emergency call back service during regular working hours throughout period of this maintenance contract.

I. Maintain an adequate stock of parts for replacement or emergency purposes, and have personnel available to ensure the fulfillment of this maintenance contract without unreasonable loss of time.

J. Cost of 24 month maintenance contract shall be included in contract cost.

END OF SECTION

HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Complete hydraulic elevator systems.
   1. Passenger type.
   2. Machine-Room Less, Hole-Less.

B. Elevator Maintenance Contract.

C. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.

1.3 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements.

B. Section 01 5000 - Temporary Facilities and Controls.

C. Section 03 3000 - Cast-in-Place Concrete: Includes elevator machine foundation, elevator pit, overhead hoist beams, grouting thresholds, and sump pit.

D. Section 04 2000 - Unit Masonry: Masonry hoistway enclosure; building-in and grouting hoistway door frames.

E. Section 05 1200 - Structural Steel Framing: Includes overhead hoist beams.

F. Section 05 5000 - Metal Fabrications: Includes elevator pit ladder, sill supports, and overhead hoist beams.

G. Section 08 7100 - Finish Hardware : Product requirements for key cylinders provided by this section.

H. Section 09 6500 - Resilient Flooring: Floor finish in car.

I. Division 22 Plumbing for sump pump and drainage piping.

J. Section 23 0300 Fans: Ventilation and temperature control of elevator equipment room.

K. Division 26 Electrical: Conduit, power, fire alarm, wiring, smoke detectors and telephone.

1.4 REFERENCE STANDARDS

A. Refer to Section 01 4100 - Regulatory Requirements.

B. ADAAG, Americans with Disabilities Act Accessibility Guidelines

C. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.

D. ASME A17.1 - Safety Code for Elevators and Escalators; 2016.

E. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; 2014.

F. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2013.

G. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

H. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

L. ANSI/UL 10B, Fire Tests of Door Assemblies.

M. EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity.

N. UL (DIR) - Online Certifications Directory; Current Edition.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other installers to provide conduits necessary for installation of wiring including but not limited to:
      a. Elevator equipment devices remote from elevator machine room or hoistway.
      b. Telephone service for emergency communications.
      c. Elevator pit for lighting and sump pump.
      d. Fire alarm panel from controller cabinet.

B. Preinstallation Meeting: Convene meeting at least two (2) weeks prior to start of this work.
   1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

C. Construction Use of Elevator: Not permitted.

1.6 SYSTEM DESCRIPTION

A. Equipment Description: : Holeless Hydraulic elevator with Machine-Roomless application.

B. Equipment Control: Elevonic® Control System.

C. Quantity of Elevators: 1

D. Elevator Stop Designations: Front Only At B, 1,2

E. Stops : 3

F. Openings: In Line

G. Travel: 24'-0".

H. Rated Capacity: 2100 lbs Passenger

I. Rated Speed: 100 fpm

J. Platform Size: 5'- 9-1/2" wide x 4'-11-1/8" deep

K. Clear Inside Dimensions: 5'-8-5/16" wide x 4'-3-9/16" deep.

L. Cab Height: 93"

M. Clear Cab Height: 7' 9"

N. Single-Slide door 36" (1067 mm)

O. Entrance Height: 7' 0" (2134 mm)

P. Main Power Supply: 208 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.

Q. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.

R. Machine and Controller Location: No machine-room required, tank and controller in hoistway pit.
   1. Hoistway accessible by a door in a side hoistway wall on the 1st landing

S. Signal Fixtures: Manufacturer's standard vandal proof buttons.

T. Stopping Accuracy: ±1/4" (6.4 mm) under any loading condition or direction of travel.

U. Operation: Simplex Collective Operation- Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served. served.

V. Operating Features - Standard
1. Full Collective Operation
2. Fan and Light Protection, Sleep Mode
3. Independent Service.
4. Full Collective Service.
5. Firefighters' Service Phase I and Phase II.
6. Top of Car Inspection.

W. Door Control Features:
1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
3. Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
4. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.
5. Provide equipment according to: Seismic Zone 2.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on following items:
1. Signal and operating fixtures, operating panels, and indicators.
2. Car design, dimensions, layout, and components.
3. Car and hoistway door and frame details.
4. Electrical characteristics and connection requirements.

C. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
2. Hoistway Components: Size and location of car guide rails, buffers, jack unit and other components.
3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
4. Individual weight of principal components; load reaction at points of support.
5. Clearances and over-travel of car.
6. Locations in hoistway of traveling cables and connections for car lighting and telephone.
7. Location and sizes of hoistway, access doors and car doors and frames.
8. Clear inside hoistway and pit dimensions
9. Electrical characteristics and connection requirements.
10. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets, finish color selection brochures, or _____.

E. Testing Agency's Qualification Statement.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Port Chester-Rye UFSD's name and registered with manufacturer.

G. Maintenance schedule for two year warranty period.

H. Operation and Maintenance Data:
   1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
   2. Operation and maintenance manual.
   3. Schematic drawings of equipment and hydraulic piping, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on hoistway apparatus.

1.8 QUALITY ASSURANCE

A. Maintain one copy of each quality standard document on site.

B. Designer Qualifications: Design guide rails, brackets, anchors, and machine anchors under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in New York.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

D. Installer Qualifications: Trained personnel and supervisor on staff of elevator equipment manufacturer.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

F. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.9 NON-PROPRIETARY EQUIPMENT

A. Equipment and component parts installed, supplied or provided under this contract shall be manufactured and distributed by a third-party, non-installer company regularly engaged in serving the elevator industry.

B. Equipment and component systems shall not employ any proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance, repairs or adjustments by all qualified contractors.

C. Manufacturer's of apparatus shall provide parts replacements on open market to all maintenance providers for equipment and component systems for as long as said parts are available to ensure apparatus or systems remain maintainable regardless of who may be selected for future service. Prior to final acceptance complete parts manuals for all major and minor component parts shall be provided.

D. Prior to final acceptance a complete set of as-built, "adjustor-level" wiring diagrams shall be provided to the Owner along with any nomenclature documents.

E. Manufacturer shall, if not maintaining the equipment, promptly notify Owner of any safety bulletins affecting said microprocessor-based control systems of which Owner or Owner's agent should take action.

F. Prior to final acceptance, Owner or Owner's representative reserve the right to accept or reject materials submitted in compliance of these paragraphs, Contractor shall have thirty (30) days to resubmit for approval, replacements for any items rejected.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty for elevator operating equipment and devices for two (2) years from Date of Substantial Completion.

1. 24 months after acceptance of elevator by owner including maintenance and emergency callback service during normal working hours.

1.11 MAINTENANCE AND SERVICECONTRACT

A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 24 months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

1.12 MAINTENANCE AND SERVICE EQUIPMENT REQUIREMENTS

A. The periodic lubrication of elevator components shall not be required, including: Sheaves, Rails, Belts, Ropes, Car and CWT guides, etc.

B. The elevator control system must:
   1. Provide in the controller the necessary devices to run the elevator in inspection operation.
   2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
   3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
   4. Provide in the event of a power outage, means from the controller to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
   5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
   6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design - Hydraulic Elevators: HydroFit, machine-room less, hole-less hydraulic passenger elevator as manufactured by Otis Elevator Company; including control system and car design.

B. Substitutions: See Section 01 2500 Substitution Procedures..

2.2 HYDRAULIC ELEVATORS

A. Provide machine-roomless holeless hydraulic elevators from manufacturer, (Basis of Design manufacturer Otis Elevator Company). The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
   1. The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.
   2. Sleep mode operation for LED ceiling lights and car fan.
   3. LED lighting standard in ceiling lights and elevator fixtures.
   4. Sleep mode operation for LED ceiling lights and car fan.

2.3 MACHINE COMPONENTS

A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.

B. The entire hydraulic system with hydraulic-fluid storage tank, power component and valves shall be located in the hoistway pit and be easily accessible for maintenance through an access door in the hoistway wall.

C. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading.

D. The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system.

E. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

F. Pressure Switch

G. Low-oil control.

2.4 HOISTWAY COMPONENTS

A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.

C. Polyurethane type buffers shall be used.

D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.

E. Hoistway Entrances:

1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
2. Sill Finish(es):
   a. Extruded Aluminum
3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour (for M1, M2, M3, D1, and D2 Entrance Arrangements or 1 hour for D3 Entrance Arrangement.
5. Entrance Finish(es):
   a. Stainless Steel
6. Frame Finish(es):
   a. Stainless Steel at Front 1,2,3
7. Entrance marking plates: Entrance jambs shall be marked with 4” x 4” (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
8. Sight Guards: Black sight guards will be furnished with all doors.

F. Fascia: Galvanized sheet steel shall be provided at the front, and rear, of the hoistway

2.5 CAR COMPONENTS

A. Cab :

1. Steel shell cab with raised stainless steel, vertical panels.

2. Black vertical trim pieces
3. Paints and laminate to be selected from manufacturer's catalog of choices.
4. Brushed Stainless Steel finished base plate located at top and bottom.

B. Car Front Finish: Satin Stainless Steel.

C. Car Door Finish: Satin Stainless Steel.

D. Ceiling Type: Brushed stainless steel flat canopy with 4 LED down lights.

E. Floor Finish: Resilient tile flooring as specified in section 09 6500.

F. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.

G. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A key switch shall be provided in the car-operating panel to control the fan.

H. Handrails: Handrails shall be provided on the Side & Rear walls of the car enclosure. Handrails shall be 3/8"x 2" (9.5mm x 51mm) Flat Tubular handrail with a Brushed Stainless Steel Finish.

I. Threshold: Extruded Aluminum

J. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

K. Guides: Car roller type guides at the top and the bottom.

L. Platform: Car platform shall be constructed of metal.

M. Certificate frame- Provide a Certificate frame with a satin stainless steel finish.

N. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.

O. Protection Blanket: Provide mounting hooks and 1 complete set of protection blankets.

2.6 SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.

B. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with:
   1. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel
   2. The car operating panel shall be equipped with the following features:
      a. Raised markings and Braille to the left hand side of each push-button.
      b. Car Position Indicator at the top of and integral to the car operating panel.
      c. Floor selection buttons with individual keyed lockout of each floor.
         a) Provide key cylinder cores and keys to match owners master key system as specified in section 08 7100.
      d. Door open and door close buttons.
      e. Inspection key-switch.
      f. Elevator Data Plate marked with elevator capacity and car number.
      g. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.

h. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
i. In car stop switch (toggle or key unless local code prohibits use)
j. Firefighter's hat
k. Firefighter's Phase II Key-switch
l. Call Cancel Button
m. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.
n. Please Exit Symbol provided in the hall.

3. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation.
1. Hall fixtures shall feature:

D. Keyswitch and Hall Button at 1,2,3
1. Integral Hall fixtures shall feature:
a. Round stainless steel, mechanical buttons marked to correspond to the landings.
b. Hall fixtures to be located in the entrance frame face. Therefore, separate wiring and installation of electrical boxes inside the wall for the hall buttons are not required
c. Buttons shall be in vertically mounted fixture.
d. Fixture shall be satin stainless steel finish.
2. Button:
a. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel
a) Access key-switch at each floor.
b) Provide key cylinder cores and keys to match owners master key system as specified in section 08 7100.

2.7 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.

D. Comply with seismic design requirements in accordance with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

E. Perform welding of steel in accordance with AWS D1.1/D1.1M.

F. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.

G. Perform electrical work in accordance with NFPA 70.

2.8 EMERGENCY POWER

A. Elevator Emergency Power Supply: Supplied by integral battery backup; provide elevator system components as required for emergency power characteristics.
1. Provide internal battery power to allow elevator to return to level of exit discharge and for hoistway and cab doors to open.

B. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

C. Provide operational control circuitry for adapting the change from normal to emergency power.

2.9 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.

B. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

C. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.

D. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

E. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

F. Resilient Flooring: Vinyl tile flooring and Resilient base, as specified in Section 09 6500.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway and pit are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.2 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components, and conform to requirements of Section 01 5000 - Temporary Facilities and Controls.

B. Maintain elevator pit excavation free of water.

3.3 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories. Refer to Division 26 Electrical.

D. Mount machines, motors, and pumps on vibration and acoustic isolators.

1. Place on structural supports and bearing plates.
2. Securely fasten to building supports.
3. Prevent lateral displacement.

E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

F. Install guide rails to allow for thermal expansion and contraction movement of guide rails.

G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

H. Bolt or weld brackets directly to structural steel hoistway framing or inserts incorporated into masonry of concrete construction.

I. Field Welds: Chip and clean away oxidation and residue with wire brush; spot prime surface with two coats.

J. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

K. Fill hoistway door frames solid with grout in accordance with Section 04 2000.

L. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.

M. Adjust equipment for smooth and quiet operation.

3.4 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Contractor shall complete all testing and inspections certified in accordance with ASME QEI-1 .
   1. Schedule tests with agencies and notify Port Chester-Rye UFSD and Fuller and D'Angelo P.C..
   2. Document regulatory agency tests and inspections in accordance with requirements.
   3. Perform tests required by regulatory agencies.
   4. Furnish test and approval certificates issued by authorities having jurisdiction.

C. Perform testing and inspection in accordance with requirements.
   1. Inspectors shall be certified in accordance with ASME QEI-1.
   2. Perform tests as required by ASME A17.2.
   3. Provide at least two weeks written notice of date and time of tests and inspections.
   4. Supply instruments and execute specific tests.

D. Operational Tests:
   1. Perform operational tests in the presence of Port Chester-Rye UFSD and Fuller and D'Angelo P.C..
   2. Provide load test in accordance with NYS Building Code.
   3. Test single elevator system by transporting at least 4 persons up from main floor to top floor landings during a five minute period.
   4. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.
      a. Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.

3.6 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch (6.4 mm) maximum from flush with sill.

3.7 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components in accordance with manufacturers written instructions.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstrate proper operation of equipment to Port Chester-Rye UFSD's designated representative.

D. Demonstration: Demonstrate operation of system to Port Chester-Rye UFSD's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, cleaning and maintenance of each component.

E. Training: Train Port Chester-Rye UFSD's personnel on cleaning and operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Manufacturer's training personnel.

4. Location: At project site, unless noted otherwise.

3.9 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch-up, repair, or replace damaged products and materials prior to Date of Substantial Completion.

3.10 MAINTENANCE

A. Refer to Section 01 7000 - Execution, for additional requirements relating to initial maintenance service.

B. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 24 months from Date of Substantial Completion.

C. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or original installer.

D. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Port Chester-Rye UFSD.

E. Examine system components periodically.

F. Include systematic examination, adjustment, and lubrication of elevator equipment.

G. Maintain and repair or replace parts, whenever required, using parts produced by original equipment manufacturer.

H. Perform work without removing cars from use during peak traffic periods.

I. Provide emergency call back service during regular working hours throughout period of this maintenance contract or warranty.

J. Maintain an adequate stock of parts for replacement or emergency purposes, and have personnel available to ensure the fulfillment of this maintenance contract without unreasonable loss of time.

K. Cost of 24 month maintenance contract shall be included in contract cost.

END OF SECTION

SECTION 22 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GENERAL CONDITIONS

A. Before submitting a proposal, Bidders shall examine all Drawings related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.

B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.

C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, fire underwriters requirements applicable to work herein specified without additional expense to the Owner. (Also local building code requirements.).

D. It is specifically intended that anything (whether material or labor) which is usually furnished as a part of such equipment as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail on the Drawings or described in the Specifications.

E. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.

F. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, but is shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

G. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working on the project.

H. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying Drawings.

END OF SECTION

SECTION 22 0125

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 SCOPE OF WORK

A. The work under this section includes all labor, materials, equipment, tools, transportation, cutting and patching, excavation and backfill and the performance of all work necessary and required for the furnishing and installation complete of all Plumbing and Drainage work as shown on Contract Drawings, as specified herein and as otherwise required by job conditions or reasonably implied, including but not necessarily limited to the following:

1. Provide complete new and altered sanitary, storm and vent piping from all new plumbing fixtures connecting to existing sanitary and vent system.

2. Provide complete new and altered hot and cold water piping to all new plumbing fixtures, equipment, etc. as indicated.

3. Provide new and altered gas service and piping and select removal of existing as indicated.

4. Provide transformers and all wiring regardless of voltage to auto-faucets and flush valves for complete installation. Junction box by Electrical Contractor. Select proper transformer based on number of fixtures.

5. Provide all new plumbing fixtures where indicated, complete including traps, stops, drains, strainers, tailpieces, faucets, escutcheons, etc.

6. Provide complete, new piping and final connections to equipment furnished under other Divisions.

7. Provide all demolition, removal disconnecting, capping, sealing of all existing plumbing piping, apparatus, equipment, fixtures, specialties, accessories, etc. which are not included or incorporated in the new layout.

8. Provide all required temporary connections to maintain all plumbing services without interruption.

9. Pipe insulation.

10. Tests and adjustments.

11. This Contractor shall obtain all permits, bonds, approvals, etc. at no additional cost to the Owner.

12. This Contractor shall provide all required sprinkler hydraulic calculations and corresponding drawings per all authorities having jurisdiction. Any deviation from Contract Documents will require calculations and drawings to be stamped and signed by a New York State Licensed Engineer.

13. This Contractor shall provide shop drawings for all plumbing fixtures, piping, valves, insulation, equipment, etc.

14. For Cutting and Patching refer to Division 1.

15. For Excavation and Backfill refer to Division 2.

16. Furnish minimum 18" x 18" access doors for all valves, cleanouts, etc. in all inaccessible walls, ceilings, etc. Installation by General Contractor.

17. Fire stopping per FM/UL and NFPA. Refer to Division 1.

B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

1.2 ALTERATION WORK

A. All equipment, piping, plumbing, fixtures, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without Owners approval.

B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.

C. No dead ends shall be left on any piping upon completion of job.

D. The existing systems shall be left in perfect working order upon completion of all new work.

E. Location and sizes of existing piping are approximate. Exact sizes and locations of all existing piping shall be verified on the job.

F. All removals shall be removed from the site.

END OF SECTION

SECTION 22 0130

WATER SUPPLY SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Furnish and install a complete cold-water distribution system to supply water to all new fixtures, water consuming equipment, and valved outlets for the use of other trades and connect to existing piping.

B. The water supply system shall be complete with all pipe, fittings, valves, mains, risers, branches, shock absorbers, air chambers, hangers, anchors, expansion loops, connections to existing piping, covering, tests, etc. all as shown on the Drawings, as hereinafter specified.

C. Furnish and install a complete hot water distribution system to supply water to all new fixtures and equipment requiring heated water.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND MATERIALS

A. All components of water supply system shall confirm to all “No Lead” requirements including NSF/ANSI-372.

B. The domestic water systems shall be of the following material and shall be in accordance with the latest ASTM and ASME Standards.

C. Domestic water piping within the buildings shall be seamless drawn or extruded tubing type "L" copper. Both shall be of Chase, Anaconda, Revere, and approved equal, hard temper ASTM B88 with solder joint sweat end fittings. Fittings for use with copper tubing shall be cast brass of Muellers "Streamlin" pattern or approved equal.

D. Joints for copper tubing shall be made with 95-5 (lead and antimony free) solder. Flanges where required shall be cast brass. Provide dielectric adapters between ferrous and non-ferrous pipe joints.

E. Underground cold water piping 3 inches or more in diameter shall be cement lined ductile iron; piping 2-1/2 inches or less in diameter shall be Type “K” copper (soft annealed) or red brass pipe. Provide proper fittings, except as otherwise shown or specified, at major changes in direction and at branch connections.

1. Ductile-iron pipe shall conform to ANSI/AWWA C151/A21.51 for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, For Water or Other Liquids.

2. Pipe shall be thickness Class 52 plain end, cement lined, furnished in nominal 18 foot laying lengths.

3. Pipe and fittings joints shall be:

   a. Mechanical joints ANSI/AWWA C110/A21.10.

   b. Joints shall conform to ANSI/AWWA C111/A21.11 for Rubber-Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings, with a minimum pressure rating of 250 psi and similar or equal to Tyton, Fastite or Belltite.

4. Fittings for ductile-iron pipe shall conform to ANSI/AWWA C104/A21.10 for Gray-Iron and Ductile-Iron Fittings, 2 inch through 48 inch for Water and Other Liquids. Fittings shall have a minimum pressure rating of 250 psi.

5. All ductile-iron pipe and fittings shall be cement mortar lined with double thickness lining, a minimum of 1/8 inch, in accordance with ANSI/AWWA C104/A21.4 for Cement Mortar Lining for Cast-Iron Ductile and Ductile-Iron Pipe and Fittings for Water.

E. All exterior underground water piping shall have a minimum of 4 feet of cover.

2.2 VALVES

A. All shut-off valves 2" and smaller shall be ball valves equal to Apollo 70 Series or Milwaukee BA100 Series Valve. Bronze body with chrome plated trim

B. This Contractor shall furnish all valves as indicated on the Drawings, or as may be required for the proper control of the pipe lines installed under this Specification, so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the Facility.

C. All domestic water valves shall have a minimum working pressure of 125 psig, steam rated unless otherwise noted on the Drawings or specified herein. All valves shall be of one manufacture as manufactured by Milwaukee Valve or Hammond.

D. All gate valves within the buildings shall be wedge gauge valves with painted iron wheel handles, shall have gland followers in stuffing boxes, and shall be so constructed that they may be repacked while open and under pressure. All valves shall have the name of the manufacturer and working pressure cast or stamped thereon.

E. All gate valves shall be all bronze with sweat or screwed joint ends as required by the piping system in which they are installed.

F. Globe valves shall be of all bronze with composition disc, threaded or sweat joint ends as required by piping system in which they are installed.

G. Check valves shall be all bronze swing check type with threaded or sweat joint ends. Check valves 4 inch and larger shall be iron body bronze mountings and shall be provided with screwed or flanged joint ends as required by piping system in which they are installed.

H. Drain valves, at risers and at low points, shall be 3/4 inch heavy cast brass with composition washers with male thread for hose connections.

2.3 SHOCK ABSORBERS

A. Shock absorbers shall be similar and equal to J.R. Smith 5000 series or Zurn Z1700 series with stainless steel pressurized shell sized in accordance with P.D.I. Bulletin WH-201.

B. Provide shock absorbers on all fixtures and equipment having quick closing valves whether or not indicated on the Drawings.

C. Provide access doors where shock absorbers are concealed.

2.4 VACUUM BREAKERS

A. Provide vacuum breakers on water supply piping to each fixture and equipment with submerged inlets, and on faucets and outlets, within the facility to which hose can be, or is attached forming a submerged inlet.

B. Set vacuum breakers in exposed readily accessible locations at least four inches above floor rim level of fixture, or high point of equipment.

C. Vacuum breakers shall be chrome-plated brass. "Watts" or other approved.

D. Vacuum breakers under constant pressure shall be of the continuous pressure type No. 9 "Watts" or Wilkins BFP-8CH or approved equal.

2.5 EXPANSION JOINTS, ANCHORS AND GUIDES

A. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted. Refer to Drawings for locations of expansion joints and related guides and anchors. The joints, guides and anchors shall be as manufactured by Flexonics Products, Metraflex or Flex-weld.

B. Branches shall be of sufficient length and have three elbow swings to allow for pipe expansion.

C. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.

D. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of this Contractor.

E. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.6 STERILIZATION

A. The entire domestic water piping system shall be thoroughly sterilized with chlorine before acceptance for domestic operation.

B. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million for 24 hours or 200 p.p.m. for one hour. The chlorinating material shall be either liquid chlorine or sodium hypochlorite solution and shall be introduced into the system and drawn to all points of the system. If possible to do so, the lines shall be thoroughly flushed before introduction of the chlorinating material. After a contact period of not less than 24 hours, the system shall be flushed with clean water until the residual content is not greater than 0.2 parts per million. All valves in the lines being sterilized shall be opened and closed several times during the contact period.

C. Sterilization and tests for purity of water in the entire piping system shall be performed by the Contractor through an approved independent testing laboratory and a certificate shall be furnished to the Architect certifying the quality of purity.

D. Per ANSI/AWWA Standard C651-05.

PART 3 - EXECUTION

3.1 INSTALLATION

A. It is the intent that each part of the plumbing system shall be complete in all details and water lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Specification so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the facility.

B. This Contractor shall examine carefully the Architectural Drawings in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.

C. In no case shall this Contractor permit his pipes to be exposed beyond finished walls or ceilings unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.

D. The water piping shall all be installed so as to drain to a valve provided by this Contractor and branches shall not be trapped but shall have continuous pitch. Where necessary to raise or lower mains, the same shall be provided with a drip and shall be properly valved.

E. Piping shall be installed, whether indicated or not, so as to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired clear heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.

F. Run piping straight and as direct as possible, in general forming right angles with or parallel to walls or other piping. Risers shall be erected plumb and true.

G. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.

H. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work has been approved by the Architect.

I. All materials shall be new and installed in a first class manner.

J. In erecting pipe, friction wrenches and vises shall be used exclusively, and any pipe cut, dented or otherwise damaged shall be replaced by this Contractor.

K. All ferrous to non-ferrous pipe connections shall be made with approved dielectric pipe or flange unions isolating joints to prevent any electrolytic action between dissimilar materials.

L. Any piece of pipe 6 inches in length or less shall be considered a nipple. All nipples with unthreaded portion 1-1/2 inch and less shall be of weight corresponding to fitting connected. Only shoulder nipples shall be used, close nipples will not be accepted.

M. Revised water service shall be in accordance with the local water supply department requirements. All water lines are to be protected from freezing. Install new piping for water service below frost line and provide concrete separations when crossing other utilities. Provide concrete thrust mass at changes of pipe direction conforming to authorities having jurisdiction.

END OF SECTION

SECTION 22 0150

SANITARY AND STORM DRAINAGE SYSTEMS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section includes all labor, materials, equipment and appliances necessary and required to completely install all drainage systems as required by the Drawings; code and as specified herein, including but not limited to the following:

B. Complete sanitary drainage and venting systems including connections to the existing sanitary drainage and venting systems.

C. Piping and final connections for equipment furnished under other Divisions.

D. Alterations and removals to existing sanitary and vent systems.

E. Tests.

1.2 QUALITY ASSURANCE

A. All Cast Iron soil pipe and fittings shall bear the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

B. Hubless Couplings:
Standard, Stainless-Steel Shielded, Couplings: Standard Couplings shall conform to CISPI 310 and ASTM C 1277. Shield Assemblies shall consist of a stainless steel bi-directional corrugated shield; stainless-steel bands and tightening devices; and a ASTM C 564, rubber sleeve with integral center stop. Couplings shall bear the NSF Trademark, and be manufactured in the USA.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND MATERIALS

A. All indoor underground storm soil, waste and vent piping shall be service weight cast iron with fittings of bell and spigot type. All exterior underground storm soil and waste piping shall be extra heavy cast iron. Each length shall have the size, weight per foot and the manufacturer's name clearly cast or stamped thereon. Weight shall be as defined by the Plumbing Code. Fittings and traps shall be similarly marked and of corresponding weights.

B. All above ground storm, soil, waste and vent piping and fittings 3" and larger shall be service weight and fittings of bell and spigot type as specified in paragraph above. Above ground waste and vent piping 2" and smaller shall be galvanized steel, fittings on waste piping shall be galvanized cast iron, recessed drainage pattern, fitting on vent piping shall be galvanized cast iron, beaded pattern, screwed joints shall be made up to be perfectly tight without the use of lead or filler of any kind, except oil or graphite. Nipples for galvanized pipe shall be shoulder type. No close nipples shall be permitted.

C. For the above ground sanitary, vent and storm piping the Contractor has the option of using Schedule 40 PVC piping conforming to IPC Table 702.1 with PVC fittings conforming to Table 702.4.

D. Joints shall be made with gasket or hemp or picked oakum and lead, at least 12 oz. of fine soft pig lead shall be used for each inch of diameter pipe used. Lead shall be run in one (1) pouring. All lead shall be pure and soft and of the best quality, and shall be sufficiently heated to run joint full at one pouring without hardening. Dross shall not be allowed to accumulate in the melting pot. See 2.1, E. for joint options where permitted.

E. All galvanized pipe and fittings shall be galvanized with prime western spelter by hot drip process.

F. The Contractor has the option of using the following types of joints with hubbless cast iron pipe only if approved by the governing agencies. These joints shall be used throughout the project. No mixing of joints shall be permitted.

1. Neoprene gasketed joints similar to Ty-Seal (for above and underground application).

2. Hubbless cast iron pipe with neoprene gaskets and stainless steel clamps (by Clamp-All or equal) above ground only. All in accordance with Cast Iron Soil and Pipe Institute Standard 301 latest edition. Hangers and supports shall be in accordance with manufacturer's recommendations.

3. Copper DWV system with 50-50 tin antimony solder, DWV with solvent welded or screwed joints meeting CS-270-65.

G. Pump Discharge Piping

1. Piping: Galvanized steel pipe, Schedule 40 with marker’s name rolled into each length.

2. Fittings

a. Threaded: Galvanized malleable iron with flat band steam pattern. Cast iron drainage pattern for waste piping.
b. Mechanical Joints: Victaulic couplings style 07 for grooved piping only, with gasket.
c. Bolted flange with gasket.

3. Joints: Teflon tape for threaded, Victaulic couplings for gasket for mechanical joint.

4. Application: Schedule 40 steel for sump pump discharge.

2.2 CLEANOUTS

A. Provide easily accessible cleanouts where indicated at base of vertical stacks at ends of horizontal drainage lines and at intervals not exceeding 50 ft.; at each change of direction; on handholes of running traps, and where necessary to make entire drainage system accessible for rodding. Provide at least 18" clearance to permit access to cleanout plugs.

B. Cleanouts for cast iron pipe shall consist of tarpped extra heavy cast iron ferrule caulked into cast iron fittings and extra heavy brass tapered screw plug with solid hexagonal unit. Cleanouts for wrought iron pipe shall consist of extra heavy brass screw plug in drainage fitting.

C. Cleanouts turning out through walls and up through floors shall be made by long sweep ells or "Y" and 1/8 bends with plugs and face or deck plates to conform to Architectural finish in the room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plated cast brass and floor plates shall be nickel bronze.

D. Cleanouts shall be full size at the pipe up to 6" inclusive. On larger size piping 6" size plugs shall be used.

E. Cleanout fittings in vertical stacks shall consist of tapped tees capable of receiving a rough brass raised head cleanout plug, J.R. Smith S-4730, Zurn Z1445-A-BP or approved equal.

F. All cleanout plugs shall be brass lubricated with graphite before installation.

G. Cleanouts occurring in cast iron soil pipe above floor at change of direction of pipe run and at ends of horizontal runs shall be J.R. Smith S-4425, Zurn Z1441-A-BP or approved equal with cast iron ferrule for caulk connection and fitted with a straight threaded tapered bronze plug with raised hex head.

H. Cleanout deck plates for finished areas shall be similar and equal to J.R. Smith 4020 series, Zurn ZB1400-X or approved equal with cast iron ferrule, scoriated cutoff sections, brass cleanout plus collar with brass bolts for waterproofed slabs. In tile floor areas the cleanout deck plates shall be recessed to tile.

2.3 FLASHING

A. Provide 6 lb. lead flashing extending at least 10" beyond edge of all floor drains and vents through roof and all floor sleeves in floors with waterproofing or vapor barriers. Flashing shall be held securely in by clamping devices.

B. All floor drains shall be provided with flashing rings and 24" square 6 lb. sheet lead flashing, properly flashed into flashing ring of the drain.

2.4 SANITARY DRAINAGE

A. A complete system of drainage shall be provided as shown on the Drawings. The system shall include all drains, leaders, branches, house drains with all pipe fittings, hangers, anchors, etc. to make a complete sanitary drainage system. The systems shall extend through house drains and terminate as indicated on the Drawings.

B. Piping shall be sizes as indicated on the Drawings. The sanitary drains shall have a pitch of 1/8" per ft. minimum unless otherwise noted. Branch connections to stacks and house drains shall pitch a minimum of 1/8" per ft.

2.5 PIPING AND FITTINGS

A. Provide piping of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING

A. The size of soil, waste and vent piping shall be as determined by the State codes, rules and regulations for plumbing and drainage, except where specifically noted to be larger by the Specifications or Drawings and all fixed rules of installation, as set forth in the codes, rules and regulations, shall be followed as part of the Specifications.

B. This Contractor shall examine carefully the Architectural plans in detail and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.

C. In no case shall this Contractor permit his pipes to be exposed beyond finished plaster lines unless specifically shown on Drawings. He shall consult with the Contractors of other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.

D. Piping shall be installed, whether indicated or not, so to rise and/or drop to clear any and all conduits, lighting fixtures, ductwork and heating mains to maintain the desired cleat heights. This Contractor shall consult with the Contractors of other trades and facilitate the erection of the equipment and piping.

E. Run piping straight and as direct as possible in general forming right angles with or parallel to walls or other piping. Risers and stacks shall be erected plumb and true. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.

F. No piping or work shall be concealed or covered until all required tests have been satisfactorily completed and work has been approved by the Architect and all other authorities having jurisdiction.

G. Branch connections shall be made with "Wye" and long "Tee-Wye" fittings, short 1/4 bends, common offsets and double hubs will not be permitted. Short "Tee-Wye" fittings are to be used in vertical piping only. All fittings shall conform to code requirements.

H. Cleanouts shall be provided at foot of all stacks, at changes of directions, at the ends of branch runs where shown and as required by code, and shall be terminated as described under cleanouts.

I. The house drains must be run at a minimum grade of 1/8" per ft. downward in the direction of flow. Wherever possible, a 1/4" per ft. pitch shall be maintained. Branch connections to stacks from fixtures shall pitch 1/4" per ft. where possible. Attention is again called to the necessity of maintaining the ceiling heights established.

J. Furnish and install complete systems of vent pipes from the various plumbing fixtures and other equipment to which drainage connections are made. Vent pipes shall be connected to the discharge of each trap and shall be carried to a point above the ultimate overflow level of the fixture before connecting with any other vent pipe; in general, this will be approximately 3'-6" above the finished floor. Branches shall be arranged to pitch back to fixtures.

K. The individual vent pipes shall be collected together in branch vent lines and connected to existing vent connections through roof.

L. Any existing vents through roof, damaged, or if flashing on roof comes loose while connecting new vent to them shall be repaired and reflashed to the roof as required to maintain waterproofing the satisfaction of the Architect.

END OF SECTION

SECTION 22 0180

NEW GAS SERVICE, STREET CONNECTIONS AND ASSOCIATED WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Furnish and install a gas supply system to gas-fired equipment as shown on Drawings.

B. The Contractor shall make all necessary arrangements with the local Utility Company to provide the new gas service as indicated on the Drawings.

C. Tests.

D. All work in this section shall comply with NFPA-54 and Fuel Gas Code of NY State.

PART 2 - PRODUCTS

2.1 GAS PIPING SYSTEM

A. All piping equipment, valves, sleeves, etc. not furnished by the Utility Company and required or indicated will be furnished and installed by the Contractor.

B. New gas underground pipe shall be mill-wrapped; all welded schedule 40 steel, unless otherwise directed by Utility Company.

PART 3 - EXECUTION

3.1 STREET CONNECTIONS

A. Contractor shall make all necessary gas connections between the building and service lines in street, as indicated on Drawings. Contractor shall obtain street opening permit and perform all work in accordance with agencies having jurisdiction. Contractor shall pay for all costs for these service connections.

B. Contractor shall be responsible for any damage caused to the work by reason of leaky, defective or broken piping connections or other appurtenances installed by him.

3.2 TESTING

A. Gas piping shall be tested with air using an air pump and mercury gauge. Tests shall be made by the Contractor with his equipment when directed by the Owner/Inspector/Construction Manager. Testing shall be done with 100 psig pressure (low pressure side) for a period of one hour and follow Utility Company procedures and all Plumbing Code requirements. Certify and submit written test results to Architect/Engineer. Indicate that system is functioning properly, and has been installed in accordance with NFPA, and all applicable codes.

B. Encase gas piping with minimum 12” of concrete where covered by paved areas and roadways.

C. Contactor is responsible for maintaining gas pressure in existing gas piping to remain in accordance with utility company requirements, whether valving off pilot lights, using bottled gas, etc. Utility fees and re-testing existing piping as required is Contractors responsibility.

END OF SECTION

SECTION 22 0300

PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all plumbing fixture work, as required by the Drawings and as specified herein, including but not limited to the following: plumbing fixtures, traps, fittings, trimmings, brackets, plates, anchor, chair carriers and supports.

B. Just before the Owner's taking over the work in the building, this Contractor shall thoroughly clean all fixtures furnished and set under this Contract, leaving every fixture in perfect condition and ready for use.

C. Submit shop drawings and roughing sheets for all equipment for checking and approval.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND EQUIPMENT

A. All fixtures shall be free from imperfections, true as to line angles, curves and color, smooth, watertight, complete in every respect and practically noiseless in operation, Fixtures specified are given as the typical standard required as manufactured by American Standard and they or other similar approved fixtures as made by Kohler of Eljer Companies shall be furnished, set and connected in good substantial, neat workmanlike manner.

B. The letter designations hereinafter correspond with the schedule on the Drawings.

1. Water Closet - Type A1
   Flush valve type, wall mounted 2257.103 "Afwall" vitreous china, siphon jet action, elongated bowl, 1-1/2" top spud, Sloan Optima hard wired, sensor operated, model 111-1.6 low consumption flush valve, Olsonite #95 open front seat cover. Provide floor mounted carrier equal to Zurn Z1203 series or Z1204 series.

2. Water Closet - Type A2 (Handicapped) Same as above except Handicapped.

3. Lavatory - Type B1 (Handicapped)
   0356.015 “Lucerne” white vitreous china lavatory with 4” centers, concealed arm support, 7723.018 offset grid drain, adjustable trap, loose key stops and all required trim. Sloan Optima hard wired, sensor operated, model ETF-600 faucet with vandal-proof aerator. Mount lavatory 34” above finished floor. Cover “P” trap and supplies and stops with Truebro “Handi-Lav-Guard” insulation kits.

4. Countertop Lavatory - Type B2 (Handicapped)
   9482.000 “Ovalyn” Universal Access Undermount, white vitreous china lavatory with 4” centers, 7723.018 offset grid drain, adjustable trap, loose key stops and all required trim. Sloan Optima hard wired, sensor operated, model ETF-600 faucet with vandal-proof aerator. Coordinate with General Contractor.

5. Single Bowl Stainless Steel Sink - Type B3
"Just Stainless Armor" Model SL-2125-16-GR 16 gauge stainless steel type 302, self-rimming single bowl, Chicago Faucet model no. 404A-317, 8-inch center, 5-inch spout, 317 4-inch blade handles, E12 aerator.

6. Art Sink - Type B4 (By General Contractor, Plumbing Contractor to hook-up complete)
Provide Clay Trap equal to Zurn model no. Z1180. Provide unions on each connection for easy maintenance.

7. Urinal - Type C
6501.010 "Washbrook" white vitreous china, siphon jet urinal, wall hanger, 3/4" top spud, outlet connection threaded 2" inside, Sloan Optima hard wired, sensor operated model no. 186-1.5 low consumption flush valve with vacuum breaker and angle stop, Josam series 17800 or Zurn Z-1222 concealed chair carrier.

8. Shower - Type D1

   a. Concealed thermostatic mixing valve that provided temperature and pressure balancing equal to Powers type T425. Scald-proof with built-in temperature adjustment. Heavy cast brass body, stainless steel faceplate, die cast lever handle, corrosion resistant material. Maximum 125 psi, wall seal gasket, color-coded dial plate, ASSE 1016 standard, and CSA B125 standard. Provide check stop, # 141-377 chrome plated brass showerhead, arm and flange and vacuum breaker.
   b. Shower floor shall be equal to Fiat model no. RM 36" x 36" of the Gibraltar Precast Terrazzo type. Shoulder shall not be less than 4" high inside, and not less than 3" wide. Rabbets shall be 1/8" wider than slabs used and shall not be less than 1/2" deep. Inside shoulder of rabbet shall be lower than outside shoulder. Drain body shall be stainless steel cast integral shall provide for a caulked lead connection of not less than 1" deep, to a 2" pipe. Strainer plate shall be of stainless steel, removable type. Terrazzo shall be made of marble chips cast in white portland cement to produce a compressive strength of not less than 3000 psi, seven days after casting. Terrazzo surface shall be ground and polished with all air holes and/or pits to be grouted and excess removed. Specify color combination: black and white marble chips in white cement is standard. Optional, available at extra cost: white marble chips in white cement: green marble chips in white cement: tan marble chips in white cement.
   c. Provide drains as shown on Drawings and described in Specifications. Coordinate with General Contractor.

9. Shower - Type D2 (Handicapped)
Same as above except with # 141-163 Deluxe CP hose with bar. Shower floor shall be equal to Fiat model no. WTR-5006 60" x 30".

   a. Receptor to have integral stainless steel entry cap. For wheelchair accessibility, receptor threshold entry height shall be 1/2" complying with the barrier free requirements of ANSI Standard A-117.1—1980. Tiling flange cast integral shall be of galvanized-bonderized steel and shall extend not less than 1" above shoulder. Shoulder shall not be less than 4" high inside, 6" high outside and not less than 3" wide.

   b. Drain body shall be stainless steel cast integral, and shall provide for a caulked lead connection not less than 1" deep to a 2" pipe, or a quick drain connection using a QDC-4 connector and shall include a removable stainless steel or brass strainer plate. It is recommended that a floor drain at or near the entrance to the shower also be included.

c. Installation: Establish 1/4" clearance between shower floor and wall. It is important that the entire area between the receptor and the building floor have a layer of mortar in order that shower floor be level.

10. Electric Water Cooler - Type E (Handicapped)
Halsey Taylor model HTHB-HAC Bottle Filling Station with Bi-Level ADA Cooler.

11. Laboratory Counter Mounted Sink - Type F
By General Contractor, Plumber to hook-up complete.

12. Mop Receptor - Type G
"Mustee" model 65M with model 63.600A heavy duty faucet, model 65.600 mop hanger, model 67.2436 wall guard.

13. Eye Wash - Type H1
Encon model no. 01045622 chrome plated brass piping fittings and swivel, chrome plated bronze ball valve with stainless steel push plate, 90° locking swivel to swing over sink, plastic heads with float off covers, vandal resistant self adjusting regulators assure even flow of 3.5 gpm under varying hydraulic conditions. Provide 11x17 sign.

14. Emergency Shower - Type H2
Encon model no. 01052527 horizontally mounted shower with 1 inch overhead pipe. Heavy wall schedule 80 hot dipped galvanized piping. 1 inch chrome plated bronze stay open ball valve with chrome plated ball and stainless steel pull rod assembly with actuation graphic. Yellow ABS plastic shower head delivers a minimum 20" diameter patter to target area 60 " above standing level. Provide graphic "Emergency Shower" sign. Provide Safe-T-Flow shower tempering system 85 degree F. temperature, 120V/1/60 with access door.

15. Roof Drains:
Jay R. Smith Model Series 1101 Duco, cast iron body with flashing clamp, large stamped sump receiver, large cast iron locking dome, support ring, adjustable top with wide roof flange, stainless steel gravel guard deck clamp and bottom outlet. Provide water guard for overflow drains.

16. Gutter Drains:
Jay R. Smith Model Series 1600, High Dome, 3" 45 degree outlet, Duco cast iron body, with bronze flashing clamp and bronze top secured with brass screens.

17. Overflow Drain Wall Outlet:
Josam model 25010 scupper with rodent screen mounted 24" above grade.

18. Floor Drains:
Josam series 30000A or Zurn Z415 type "B" coated cast iron, two piece body with double drainage flange, flashing collar, weepholes, bottom outlet and adjustable strainer.

19. Funnel Floor Drains: Same as above except with E2 series funnel or Zurn type "E" funnel.

20. Floor Sinks:
Zurn ZS-1905 Type 304 stainless steel floor sink, seepage pan, loose-set grate with 1/2" square holes and anti-splash interior dome strainer.

21. Funnel Floor Sinks: Same as above except with Type F-6 funnel.

22. Pipe Heat Tracing:
Equal to Easy-Heat series FP, constant wattage, 12 gauge copper bus, FEP Teflon bus insulation, nickel/chrome alloy heating wire, FEP Teflon outer jacket. 8 watts per foot, 120/1/60. Install per manufacturers recommendations. Connect wiring to junction box and provide all additional required wiring. Provide at all Science room island Teacher's Desk water piping in ceiling below.

22. Wall Hydrants (Exterior): J.R. Smith Fig. No. 5509 Qt. or approved equal. Non-freeze, cast brass, 3/4" straight nozzle, hose outlet, brass casing, solder inlet, key operated, length as required. Provide recessed wall box.

23. Wall Hydrants (Interior): J.R. Smith 5609 QT bronze nickel plated quarter turn with ¾" hose connection, integral vacuum breaker with vandal resistant cap and T-handle key. Install under lavatories in all toilet rooms with recessed wall box.

24. Domestic Hot Water Circulator Pump CP-1 and CP-2:
Furnish and install domestic water circulator as indicated on Drawings. Grundfos model no. UP-43-75-BF, 22 gpm @ 15 ft. of head, 1/6 hp, stainless steel impeller, aluminum housing, bronze pump volute.

25. Elevator Sump Pumps:
"Oil Minder" by Stancor model AHS-05 with plug for outlet. Oil sensor to send signal to alarm panel and prevent operation when oil is detected. Vertical float switch 10 gpm @ 20ft. HD, 1/2 hp, 120/1/60. Type K NEMA enclosure. Mount panel in elevator machine room. Coordinate pit size with General Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All fixtures shown on Drawings shall be set, connected and tested by the Contractor. He shall also make all water; soil, waste, vent and other service connections to fixtures as shown on Drawings or as directed and shall set, furnish, connect and test all necessary fittings.

B. All pipes at fixtures passing into walls, floors or partitions shall be provided with heavy cast brass escutcheons and security (tamperproof) set screws finished to match the pipe. No "waiving" of this section will be permitted.

C. All fittings escutcheons, faucets, traps, exposed piping etc. shall be brass, chrome plated over nickel plate with polished finish. Any visible hanger nuts shall be security (tamperproof) type and shall likewise be chrome plated over nickel plate.

D. This Contractor shall be responsible for protecting all plumbing fixtures including in these Specifications against injury from the building materials, tools and equipment. Any fixtures damaged during the construction period shall be replaced new. After all fixtures are set, this Contractor shall carefully grout all around fixtures.

END OF SECTION

SECTION 22 0310

BACKFLOW PREVENTERS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SUBMITTALS

A. Product Data: Manufacturers catalog sheets, specifications, and installation instructions for each type backflow preventer.

B. Approval: Local water utility company and local department of health.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with the State Department of Health Sanitary Code for Cross Connection Control, and the other standards listed in Part 2 of this Section.
2. Where conflicts occur between the referenced standards, the most stringent requirements shall apply.

1.3 MAINTENANCE

A. Special Tools (as furnished or recommended by the backflow preventer manufacturer). Deliver to the Owner's Representative:

1. Test Kit B: Sight tube, of required length, for testing backflow preventer for proper operation, and printed procedure for conducting test.
2. Test must be performed by a Certified tester.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTER

A. Double Check Valve device on fire protection service equal to Watts series DCDA LF 709, conforming to ASSE Standard 1015, AWWA C-506, USC Specifications manual for Cross Connection control, and listed as acceptable in the New York State Department of Health, Environmental Health manual.

1. Performance: 150 psig and 130 degrees F, maximum working conditions.

2. Assembly: Gate valve on inlet side, gate valve on outlet side, and four test cocks, all as furnished or recommended by the backflow preventer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the work of this section in accordance with the manufacturer's printed installation instructions and local water utility co. and department of health.

B. Anchor piping to structure at each elbow to secure in the event of a pressure surge.

3.2 FIELD QUALITY CONTROL

A. Operation Test: Test kit as specified under Part 1 of this section may be used. Conduct test in the presence of the Owner's Representative.

1. Type B Backflow Preventer: Test the device with the test kit in accordance with the manufacturer's test procedure.

B. Re-testing: Repair or replace any device failing the operation test, and repeat the test.

3.3 APPLICATION, FEES AND PERMITS

A. This Contractor shall be responsible for hiring an engineer, filing all applications, permits and filing fees with the authorities having jurisdiction over the work. Coordinate with the General Conditions of Division 1 for "Design Responsibilities" and "Permit and Fee" requirements.

B. The following list serves as the minimum filing requirements, failure to list any item does not relieve the Contractor from fulfilling that requirement.

1. Prepare and submit DOH forms with plans, Professional Engineers Report and Specifications with "Seal".

2. Certificate of Resolution of Letter of Authorization from Owner/User to authorize licensed professional to execute design.

3. Filing fees, per device.

4. Evidence of conformance to New York State Sanitary Code, Part 5 and Chapter 873 o f the Laws of Westchester County.

END OF SECTION

SECTION 22 0370

SPRINKLER SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work covered by this section consists of furnishing all labor, equipment, appliances, materials and performing all operations necessary for the installation of an automatic sprinkler systems all in strict conformance with NFPA, insurance regulatory agency and requirements of all authorities having jurisdiction. Provide approved hydraulically designed Drawings and calculations as required by insurance regulatory agency.

1.2 REFERENCES

A. NFPA 13 - National Fire Protection Association Standard for the Installation of Sprinkler Systems.

1.3 SYSTEM DESCRIPTION

A. Type of System: Wet System - Hydraulic.

B. Occupancy Classification: Ordinary Hazard Occupancy.

1.4 SUBMITTALS

A. Shop Drawings

1. Complete sprinkler system layout indicating the locations of sprinkler heads, devices, and accessories. Include separate details of special or not easily visualized piping arrangements and inspectors test valves and connections.

2. Hydraulic calculations shall be complete and cross referenced to the appropriate Drawing sheets per all Authorities having jurisdiction. Any deviations from Contract Documents require hydraulic calculations and sprinkler shop drawings to be stamped and signed by a Licensed NYS Professional Engineer.

3. Dry system discharge shall not exceed 60 seconds from inspector's test connection per NFPA-13 7.2.3.2, submit with hydraulic calculations before fabrication.

4. Submit four (4) copies of Drawings to Owner's Risk Management Group for approval.

B. Product Data: Catalog sheets, specifications, and installation instructions. Indicate UL or FM approval for each product. Include the following additional information:

1. Electrical Devices: Complete description of intended use, wiring diagrams, data plate information and, in the case of switching devices, whether normally on, or normally off. Include motor test data.
2. Mechanical Devices: Complete description of intended use, including normal operating capacities and working pressures.
3. Enclosures: Dimensions, materials, gauges of metals; type of door hinges and locks, and methods of securing the enclosure members to the building construction.
4. Hose Threads: Verify that hose threads on fire department connections match threads on equipment used by the local or servicing fire department.

C. Quality Control Submittals

1. Design Data: The portions of the sprinkler system not sized on the Contract Drawings shall be sized in accordance with NFPA requirements for Hydraulically Designed Systems. Submit Drawings and hydraulic calculations for approval.

2. Certificates: As required under Quality Assurance Article.

3. Installers Qualification Data

a. Name of each person who will be performing the Work.

b. Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.

D. Contract Closeout Submittals

1. Operation and Maintenance Data. Deliver 2 copies to the Owner's Representative

a. Instruction manual describing the operation and maintenance of the system.

b. Parts list for each mechanical and electrical device.

c. Publication NFPA 13A, Inspection, Testing, and Maintenance of Sprinkler Systems.

1.5 QUALITY ASSURANCE

A. Qualifications: The persons employed to perform the work of this section and their supervisor shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of sprinkler systems. Upon request, furnish to the Owner the names and addresses of five similar projects, which the foregoing people, have worked on during the past 3 years.

B. Regulatory Requirements: Materials for the work of this section shall be Underwriters Laboratories listed, and/or Factory Mutual approved.

C. Certification: NFPA Contractor's Material and Test Certificate.

1.6 MAINTENANCE

A. Spare Parts: Furnish the following items and deliver to the Owner's Representative for storage in spare sprinkler head cabinets:

1. Spare sprinkler heads of required temperature range as follows:

Quantity	Type
5	standard upright
5	concealed ceiling
1	side wall horizontal
1	dry type

2. One sprinkler head wrench to fit each type sprinkler head listed above.

PART 2 - PRODUCTS

2.1 VALVES AND ACCESSORIES (All Tamper Proof and Monitored)

A. Gate Valves (175 psig non-shock working pressure)

1. 3/4 inch to 2 inch: Bronze body, OS & Y indicating type; double or wedge disc with threaded ends.

2. 2-1/2 inch and larger: IBBM, OS & Y indicating type; double or wedge disc with end connections as required to suit the piping system.

B. Valve Locking Devices

1. Chain: 3/16 inch galvanized steel, welded link.
2. Padlock: Series 800 by Yale, Eaton Corp., Charlotte, NC: Key all locks alike. Furnish 2 keys for each lock.
3. Key Tags: 1-1/2 inch diameter, brass, stamped with valve number and service.
4. "S" Hooks: Brass, for securing keys to key tags.

C. Check Valves: IBBM, single clapper swing check with metal to metal or rubber faced checks, suitable for horizontal and vertical installation; end connections as required to suit the piping system; 175 psig non-shock working pressure. Ball Drip (where shown on Drawings): Brass, automatic; threaded on both ends.

D. Fire Hose Valve: 2-1/2" Fire Department valve Crocker 5000 Series. Provide sign "FIRE DEPT. VALVE". Obtain Port Chester Fire Department approvals for all valves including stairwell valves. Install riser clamps to avoid trip hazard.

E. Pressure Gauges: Range of 2 times system working pressure at point where installed. Equip with gauge cock and provisions for draining.

F. Inspector's Test Connection: Cast brass, capped, sprinkler line tester fitting; Elkhart Brass Mfg. Co.'s. No. 112, or Seco Mfg., Inc.'s No. 445 or 446.

G. Dry Valve

1. Reliable model D with all trim accessories.
2. Provide low air pressure switch and flow switch and connect to fire alarm panel.
3. Air compressor Gast model 4LCB-21-M450X-20 Gallon, 1/3 H.P., 120/1/60 3.1 CFM @ 40 psi.

2.2 SPRINKLER HEADS AND APPURTENANCES

A. Sprinkler Heads: Brass or bronze, with standard 1/2 inch orifice, and deflector, as manufactured by Reliable Sprinkler Co., Grinnell, Fire Protection Co., or Elkhart Brass Manufacturing Co.

1. Upright or Pendent Type: (Quick Response) Provide in areas with no ceiling. Deflector designed to distribute water downward in a uniform hemispherical spray pattern. Reliable model GFR.
2. Concealed Type: (Quick Response) Provide in finished areas. All parts of sprinkler body including shank thread mounts above lower plane of finished ceiling, Reliable model G4QR.
3. Sidewall Type: (Quick Response) Equal to Reliable model GFR.
4. Markings: Stamp sprinkler type on deflector in addition to NFPA's color code requirements covering temperature classification.
5. Finish: White.

B. All sprinkler heads in skylights and boiler rooms shall be high heat type. Contractor may use swing joints to sprinkler heads where applicable.

C. Spare Sprinkler Head Cabinet: Steel, with hinged cover, constructed of minimum 20 gauge material and fitted with 16 gauge steel racks designed to hold quantities and types of spare sprinkler heads and sprinkler head wrenches. Finish shall be bright red, baked on enamel.

2.3 FIRE DEPARTMENT CONNECTION

A. Wall Type Siamese Connection: Brass body with polished finish; size per local authority, 2 individual drop clapper valves, plugs and chains, and escutcheon. Provide automatic check valve and ball-drip (Reliable model C). Submit to Port Chester Fire Department for approval.

B. Provide roof manifold units where shown on Drawings equal to Croker 6880 series. Submit to Port Chester Fire Department for approval.

2.4 WATER FLOW ALARM DEVICE

A. Pressure Type Waterflow Switch - Equal to Reliable's model E having:

1. Corrosion-resistant vane.
2. Splash/dust resistant enclosure with anti-tamper switch.
3. Adjustable pneumatic retard.
4. Screw type wiring terminals.
5. Switch rated minimum 7.0 amps at 125 V ac and 0.25 amps at 125 V dc.

2.5 VALVE SUPERVISORY SWITCHES

A. Mechanically actuated, designed to close contacts and sound an alarm when supervised valve is closed and when switch cover removed.

1. For Gate Valves: Potter Electric Signal Co.'s OSYSU-A, or Grinnell's F640.
2. For Post Indicator Valves: Potter Electric Signal Co.'s PIVSU-A2, or Potter-Roemer, Inc.'s 6223.

2.6 STEEL PIPE AND FITTINGS

A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A53 or ASTM A135.

B. Cast Iron Fittings

1. Drainage Pattern, Threaded: ASME B16.12.
2. Steam Pattern, Threaded: ASME B16.4.
   a. Standard Weight: Class 125.
   b. Extra Heavy Weight: Class 250.
3. Flanged Fittings and Threaded Flanges: ASME B16.1.
   a. Standard Weight: Class 125.
   b. Extra Heavy: Class 250.

C. Unions: Malleable iron, 250 lb. class, brass to iron or brass to brass seats.

D. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

E. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.7 DUCTILE IRON PIPE AND FITTINGS

A. Water Pipe: Bitumen coated and cement-mortar lined; AWWA C151.

1. 3 and 4 Inch Sizes: Class 51.
2. 6 inch Size and Over: Class 50.

B. Fittings: Bitumen coated and cement-mortar lined; AWWA C110.

2.8 BOLTED MECHANICAL BRANCH CONNECTION

A. Victaulic Co.'s “Firelock” rigid coupling.

2.9 JOINING AND SEALANT MATERIALS

A. Thread Sealant

1. LA-CO Industries' Slic-Tite.
2. Loctite Corp.'s pipe sealant with Teflon.

B. Joint Packing
1. Oakum: FS A-A-1186.

C. Gaskets For Use With Ductile Iron Water Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.

D. Flange Gasket Material
1. For Use With Cold Water: 1/16 inch thick rubber.

E. Gaskets For Use With Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.

F. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.10 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

A. Oakum: FS A-A-1186.

B. Mechanical Modular Seals: Thunderline Corp.'s Link Seal wall and floor seals designed for the service of piping system in which installed.

2.11 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gauge galvanized sheet steel.

C. Type C: Schedule 40 steel piping with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening through the metal deck.

D. Type D: No. 16 gauge galvanized sheet steel with 16 gauge sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening through the metal deck.

2.12 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Polished chrome plated finish, with set screw.
   1. Solid Type: Models 5 and 5T by Pegasus Mfg. Inc., Cheshire, CT; and models 951 - 960 (inclusive) by Bridgeport Plumbing Products, Moutrie, GA.

B. Cast Iron: Solid type, unplated, with set screw; model 395 by Grinnell Corp., Cranston, RI.

2.13 SUPPORTS, HANGERS AND ANCHORS

A. Pipe hangers, supports anchors, etc. shall be designed and fabricated to comply with NFPA Code No. 13.

B. Hangers for piping below the roof shall be supported from the roof or the building structural steel. Where hangers cannot be supported directly from the building roof of structural members, any additional steel required to support the hangers shall be furnished and erected. No drilling of or welding to, structural members shall be permitted. All structural attachments shall be beam clamps. Inserts and sleeves for supports shall be provided in concrete where necessary.

2.14 SIGNS

A. Steel with vitreous enamel finish, lettering on contrasting background to identify and indicate the function of:
   1. Control valves.
   2. Drain and test valves.
   3. Hydraulic Design Nameplate Data: Size approx. 9 x 12 inches, inscribed with the following:
      a. SPRINKLER SYSTEM HYDRAULICALLY DESIGNED (in block letters).
      b. Location and area of hydraulically designed section.
      c. Discharge density over designed area in gallons per minute.
      d. Residual pressure at base of riser supplying water to designed section.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless otherwise shown or specified, install the Work of this section in accordance with NFPA 13, and the item manufacturer's installation instructions.

B. Before beginning work, Contractor shall obtain all bonds, permits, fees, etc. from all authorities having jurisdiction.

C. Locking Valves
   1. Lock gate valves in open position with chain looped through handwheel and around adjacent sprinkler pipe. Secure with padlock.
   2. Lock test outlet valve in closed position with padlock.

D. Spare Sprinkler Head Cabinet: Secure to building wall or other permanent structure in vicinity of main valve controlling sprinkler system, unless otherwise directed.

E. Signs: Install signs identifying the following:

   1. Valves: One for each size, type and function.
   2. Water Motor Alarm.
   3. Hydraulically Designed System.

F. Workmanship

1. All work shall be performed in a practical and workmanlike manner by mechanics skilled in the work they are to do using the best practices of their trade.

2. No work shall be covered or hidden from view until it has been inspected and approved by the Engineer.

3. Any workmanship or materials not meeting with the requirements of the Contract Documents and/or the satisfaction of the Engineer shall be rejected. The Contractor shall immediately replace defective work and materials as required by the Engineer, at no additional cost to the Owner.

G. Cutting and Patching: Unless otherwise specified, the Contractor shall do all cutting and patching necessary for the installation of work in accordance with Division 1 of Specifications. This cutting and patching shall be done only after having obtained the Engineer's approval as to the location and extent of the cutting.

H. Drain Connections: Contractor is cautioned to arrange his permanent installation of piping in such a manner to that all or any part of the work may be completely drained. All piping shall be pitched so as to drain to the main drain.

I. As-Built Drawings: This Contractor shall keep an accurate dimensional record of all mechanical work on marked prints. The Contractor shall furnish one (1) set of as-built, reproducibles at the completion of the project and before final payment shall be made.

3.2 FIELD QUALITY CONTROL

A. Tests: Unless otherwise shown or specified, perform tests in accordance with NFPA 13.

1. Flushing: In addition to the requirements of the Standard, flush new piping before making final connection to existing systems and before performing hydrostatic test. Flush at rates of flow prescribed in the Contractor's Material and Test Certificate.

2. After making final connections, flush entire system and assure that debris is removed from piping and there are no stoppages or obstructions in the system.

3. System Tests

   a. Test all New Work.
   b. Notify the Owner's Representative when the work of this section is ready for testing.
   c. Perform the tests when directed, and in the Owner's Representatives presence.

4. Furnish Certificate of Approval for completed system to the Owner.

END OF SECTION

SECTION 22 0380

AUTOMATIC FIRE PUMP-COMBINATION SYSTEM STANDPIPE AND SPRINKLERS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Provide one (1) Diesel Fire Pump as herein described and indicated on the plans to serve the Combination Standpipe and Sprinkler System. The Diesel Fire Pump shall be Underwriters Laboratories (UL) Listed-Factory Mutual (FM) Approved. The Diesel Fire Pump shall be complete with all accessories and controls and shall meet the following construction requirements.

PART 2 - PRODUCTS

2.1 PUMP

A. One ITT A-C model 8100 Series 8x6x18F Horizontal Diesel Fire Pump (Quimby Equipment Co., Inc., Plainview, New York) having a capacity of 1000GPM at a pressure boost of 100 PSI (231 Feet TDH). The Diesel Fire Pump shall be UL and FM Listed.

B. The Diesel Fire Pump shall have a bronze impeller with smooth water passages, Bronze shaft sleeve, packed stuffing boxes with lantern rings and cast iron casing.

C. The Diesel Fire Pump shall furnish not less than 150% of rated capacity at a pressure not less than 65% of rated head.

D. The shut-off head of the Diesel Fire Pump shall not exceed 120% of total rated head.

2.2 DIESEL ENGINE

A. The Diesel Fire Pump shall be driven by a Clarke model JU4H-UFAD58 Diesel Engine Rated for 110 Brake Horsepower at 1780 RPM, with Tier 3 Emissions.

2.3 DIESEL FIRE PUMP CONTROLLER

A. The Diesel Fire Pump Controller shall be a Cutler Hammer model FD120 specifically approved for Diesel Fire Pump Service. The Diesel Fire Pump Controller shall be Underwriters Laboratories (UL) Listed-Factory Mutual (FM) Approved.

B. The Diesel Fire Pump Controller shall be built strictly in accordance with latest edition of NFPA-20.

C. The Controller shall be listed for Fire Protection Service by an independent testing laboratory and shall bear a label indicating such compliance.

2.4 BUILT–IN BATTERY CHARGER

A. Two (2) independent battery chargers shall have reverse polarity protection / indication and shall be capable of recharging a completely discharged battery within 24 hours.

2.5 DIESEL CONTROLLER

A. The controller shall be designed with internal components that are front mounted and wired for ease of inspection and maintenance. All relays shall be of plug in type, identical, and complete with visual indication to show relays are energized. The controller shall include an LCD display to indicate battery voltage and amperes as well as system pressure.

B. The controller enclosure shall be constructed in accordance with NEMA 2 requirements to provide protection against dust, dirt, and dripping water.

C. The controller shall be microprocessor based as manufactured by Cutler Hammer. Computer and relay based Fire Pump Controllers will not be acceptable.

D. A line printer- recorder, capable of operation between 8-30VDC, that will produce hard copy reports of system STATUS; including time, date, weekly test time, AC power failure status, print and stop mode status, sequential start time, RPT setting, system pressure set points, charger amperes and battery voltage plus pump running status reports plus pump running status reports and alarm data. The controller shall have the capability of storing 1024 events for furtherance it the line printer-recorder.

E. The controller shall provide audible and visual indication of the following alarm conditions:

- Low Engine Oil Pressure
- High Engine Jacket Water Temperature
- Failure to Start Automatically
- AC or Charger Failure (local alarm not required)
- Battery 1 Failure
- Battery 2 Failure
- Engine Overspeed
- High and Low Fuel Level (The Low Fuel Level Switch is to be shipped with the Diesel Fire Pump Controller and Field installed in the Diesel Fuel Tank)

F. The Cutler Hammer FD120 Diesel Fire Pump Controller shall be complete with a Fan Louver Relay. This relay shall be capable of energizing a Fan Louver Motor when the Diesel Fire Pump starts.

2.6 PACKAGED SYSTEM

A. The Fire Pump Controller will be factory mounted on the base plate with the Fire Pump and pre-wired to the Diesel Engine.

PART 3 - EXECUTION

3.1 DIESEL FIRE PUMP ACCESSORIES

A. The Diesel Fire Pump shall be supplied with the following accessories:

1. One (1) combination 30" Hg to 100 PSI suction gauge, 4 1/2" dial type with 1/4" cock and Lever handle.
2. One (1) 0 to 300 PSI discharge gauge, 4 ½" cock lever and handle.
3. One (1) 1/2-inch Automatic Air Release Valve
4. One (1) 4"x 4" Muesco Pilot Type Main Relief Valve (125# x 125#)
5. One (1) 4"x 8" Enclosed Waste Cone (125# x 125#)
6. One (1) 6-inch Outside Hose Valve Header (125 #)
7. Four (4) 2 ½ - inch Hose Valves (NST Threads)

3.2 DIESEL ENGINE ACCESSORIES

A. The Diesel Engine shall be supplied with the following accessories:

1. 185 Gallon Double Wall Fuel Tank with Legs.
2. Direct Reading Fuel Gauge
3. Two (2) sets of Heavy Duty Lead-Acid Commercial Batteries with Battery Rack and Battery Cables.
4. Residential 4" Muffler
5. Flexible 4" Engine Exhaust Connector

3.3 JOCKEY PUMP AND CONTROLLER

A. The Jockey Pump shall be a Grundfos CR series model CR3-7, centrifugal close-coupled vertical type, mechanical sealed, cast iron suction and discharge chambers, with stainless steel impellers, shaft and wet parts. Designed for 10 GPM - 254 Feet TDH (110 PSI) - 3450 RPM complete with vertical open drip-proof motor rated 1.5 HP - 1 Phase - 60 Cycle - 208 Volt* operation.

B. The Jockey Pump Control Panel shall include an across-the-line magnetic starter, fused disconnect switch, HOA switch and pressure switch.

3.4 FIRE PUMP TESTING

A. Inspection of the completed installation prior to start-up including proper installation of fire pump, fittings, fire pump controller (including wiring), jockey pump and jockey pump controller. Any discrepancies shall be brought to the attention of the sprinkler and/or electrical contractors and corrected under supervision of the fire pump manufacturer's representative.

B. Start-up and adjustment: Prior to start-up, the fire pump manufacturer's representative shall check the pump and make any adjustments as recommended by the pump manufacturer. All controllers will be thoroughly check for looseness of wires and/or connections and adjustments made where necessary. The pump and jockey pump motors shall be "bumped" for proper rotation by manufacturer's representative and any corrections that are necessary will be performed by the Electrical Contractor under the supervision of the pump/controller Manufacturer's representative.

C. Field Test of Fire Pump: The fire pump shall be given a complete field flow test by the pump manufacturer's representative under the direction, supervision and as required by the representative of the "authority having jurisdiction".

D. Verification of pressures, voltages, amperes and RPM's shall be recorded. Flow and pressure results shall be superimposed on a factory certified performance test curve provided by the manufacturer's representative and six (6) copies shall be finished to the sprinkler contractor for distribution as required.

E. Any corrections, repair and/or modification to the equipment necessary to meet the field performance shall be accomplished at no cost to the Owners or his representative.

F. The manufacturer's representative for ITT A-C Fire Pump Company is:

Quimby Equipment Co., Inc.
159 Express Street Plainview, NY 11803
Phone: (516) 349-5959 Fax: (516) 349-0709

G. Provide exterior test header.

END OF SECTION

SECTION 22 0420

SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. This Contractor shall furnish and install all plates, hangers and supports for his piping.

B. All piping shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING

A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.

B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.

C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.

D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.

E. Piping shall be supported as follows unless otherwise indicated on the Drawings:

1. Piping: 1-1/2 inch and smaller Fig. #260 adjustable clevis hanger. 2 inch and larger Fig. #174 one-rod swivel roll hanger.

2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.

3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.

4. Spacing of pipe supports shall not exceed 6 feet for pipes up to 1-1/2 inch and 10 feet on all other piping.

5. Hangers shall pass around insulation and a 16 gauge steel protective band, 12 inch long shall be inserted between hangers and insulation.

6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.

7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in a manner to allow for proper expansion and elimination of vibration.

8. 2 inch and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.

9. All horizontal pipe, where run overhead or on walls, shall be supported as follows unless otherwise indicated: On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4 inch.

F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.

G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.

H. Hanger rods shall be steel, threaded with nuts and lock nuts, sizes in accordance with following schedule:

Pipe Size	Rod Size
3/4" to 2" inclusive	3/8”
2-1/2" and 3" inclusive	1/2”
4" and 5" inclusive	5/8”
6”	3/4”
8" to 12" inclusive	7/8”

I. Cast iron piping shall be supported at intervals of not more than (5) feet (at each hub) on straight runs.

PART 3 - EXECUTION

3.1 PIPING

A. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.

B. Sleeves shall not be used in any portion of building where use of same would impair strength or construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.

C. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.

D. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors shall be heavy forged construction entirely separate from supports.

E. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strains on offsets and branches. Anchors, unless otherwise noted shall be heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.

F. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor.

G. All operating equipment including pumps, piping, etc. shall be supported so as to produce minimum amount of noise transmission.

END OF SECTION

SECTION 22 0430

INSULATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all insulation work as required by the Drawings and as specified herein including but not limited to the following: Insulation, covering, bands, tie wire.

PART 2 - PRODUCTS

2.1 INSULATION

A. The materials as specified have been selected from the catalogs of Owens-Corning Fiberglass Corp. and Johns-Manville Sales Corporation and are representative of the quality, design and finish desired. Insulation as manufactured by Gustin Bacon Co., or other approved manufacturer may be submitted for approval provided the product meets fully in all respects (such as density, moisture absorption, alkalinity, thermal-conductivity, jackets) to the materials as delineated below.

B. All insulation shall be UL rated non-combustible type classified flame spread-25, smoke-developed-50.

C. All insulation thicknesses shall conform to 2015 IECC table C403.2.10

2.2 PIPING, FITTINGS AND VALVES

A. All insulation thickness shall be in accordance with the latest edition of the New York State Energy Conservation Construction Code.

B. Minimum pipe insulation shall be:

1. Hot water piping up to 2"-1" insulation and piping 2-1/2" and larger - 1-1/2" insulation.

2. Cold water piping up to 2" - ¾" insulation and piping 2-1/2" and larger - 1" insulation.

C. Domestic cold, hot water hot water return indirect waste, storm and piping aboveground. All piping shall be insulated with sectional glass fiber insulation, Owens-Corning 2 piece ASJ/SSL. Joints between sections shall be sealed with factory supplied 3 inch wide sealing strips. Sealing by means of Owens Corning self sealing lap will also be acceptable. Install (anti-sweat) vapor barriers on all cold water piping.

D. Domestic hot and cold water valves and fittings - Fittings, valves, etc. shall be insulated with flexible blanket insulation compressed to 1/2 its thickness, tied on with jute twine over which shall be applied a flood coat of Insul-Coustic IC-102 and 10-20 open weave glass cloth. Glass cloth to be finished within additional coat of IC-102. Insulation blanket shall be Owens-Corning wrap.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All insulation on pipes running through walls, floors, partitions and beams shall be continuous through sleeves and openings.

B. Insulation shall be installed only after all tests of the piping system have been completed.

C. All insulation shall fit snugly.

D. All surfaces shall be clean and dry when insulation is applied.

E. Longitudinal joints shall be on least conspicuous side off the pipe.

F. Valves shall be insulated up to the packing unit.

G. As specified hereinbefore, all horizontal runs of piping will be supported on adjustable clevis or group trapeze type hangers. Pipe hangers will be installed outside of the insulation. Where hangers occur, prefabricated insulation protective saddles shall be "Insul-Shield-Multi-Purpose-Saddle" as manufactured by Insul-Coustic Corp. or approved equal.

H. Hot and cold water branch piping extending through slab or knockout panels to serve equipment shall be insulated to a point 4 inch above the top of sleeve provided for pipe.

I. The use of staples shall not be permitted.

J. It is the intent of this Specification that all vapor barriers be continuous throughout. Reinstate existing piping at point of new pipe connections.

END OF SECTION

SECTION 22 0470

TESTS AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 TESTS AND ADJUSTMENTS

A. The Contractor shall, at his own expense, during the progress of the work or upon its completion as ordered make such tests as are specified or as required by and in the presence of the Architects, Building Inspectors, etc. At least 48 hours notice shall be given in advance of all tests.

B. The Contractors shall provide all apparatus, temporary work or other requirements necessary for all tests. He shall take all due precautions to prevent damage to the building, its contents or the work of the other Contractors, that may be incurred by all tests. This Contractors shall also be responsible for the work of other Contractors that may be damaged or disturbed by the tests or the repair or replacement of his work, and he shall without extra charges, restore to its original condition, any work of other Contractors to do the work of restoration.

C. Tests on the various systems may be conducted in sections as the work progresses or when the systems are completed.

D. No caulking of pipe joints to remedy leaks will be permitted except where joints are made with lead and oakum.

E. Each section of the sanitary, storm and vent piping tested shall have all openings tightly closed with screw plugs, or equal device. The drainage and vent systems shall be filled with water and proven tight under a 10'-0" head for a minimum of four (4) hours. Water level must remain constant through test without adding water.

F. Upon final completion of the sanitary systems and when all fixtures and appurtenances have been set and the systems are in complete working order, all traps in the systems shall be filled with water and a thick penetrating smoke shall be introduced into the entire system.

G. As smoke appears at the stack openings on the roof, such openings on the roof shall be tightly closed and a pressure equivalent to 1-1/2 inch of water shall be maintained during the test. Oils of peppermint shall be added at the smoke making machines so that any leakage is readily discernible.

H. Before any covering is applied to the domestic water piping systems, the entire domestic water piping systems shall be hydrostatically tested for eight (8) hours to a hydraulic pressure of 125 psig.

I. At the completion of the test, Contractor shall furnish the Owner with one (1) copy of test certificates as issued by the insurance company.

J. Adjustments: Tests and adjustments shall be repeated as often as necessary until the systems are tight and are to the entire satisfaction of the Plumbing Inspector, Engineers and any other authorities having jurisdiction.

1. Contractor is to thoroughly instruct the building custodian in the proper care and operation of the entire system. Contractor shall prepare for use by custodian, detailed brochures of instructions in non-technical terms, describing the maintenance and operation of all fixtures, apparatus, valves, controls etc. furnished by him.

2. Should any part of the work performed under this Contract fail to function because of cracked piping, obstructions, debris in piping, leaks in piping or any other cause, this Contractor shall disconnect, clean and reconstruct the work at his own expense and pay for any damages to adjoining work.

3. Water flow is to be balanced and adjusted to all flushvalves, faucets, etc.

4. All parts of the plumbing system are to be thoroughly flushed until cleared of all grease and sediment and all dirt pockets cleaned. Repeat as often as necessary, open all cleanouts and reset in graphite.

5. All new motors shall be oiled as required.

6. All new valves are to have stuffing boxes packed and adjusted.

END OF SECTION

SECTION 22 0480

TAGS, CHARTS AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 TAGS, CHARTS AND IDENTIFICATION

A. Every valve installed under this Contract shall be tagged or labeled as follows: Tag shall be etched brass securely fastened to valve handwheels with heavy brass "S" hooks, soldered closed. At lock shield and similar type valves, tags for same shall be securely wired to valve body.

B. Charts shall be provided for each piping system, as approved and shall consist of schematic diagrams of piping layouts showing and identifying each valve and piece of equipment etc., and its use. Upon completion one (1) copy of diagrams and valve charts suitably framed under glass, shall be furnished and mounted where directed. One (1) copy of diagrams and valve charts shall be delivered to Owner.

C. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.

D. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.

E. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.

F. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment at changes in direction.

END OF SECTION

SECTION 22 0490

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within two (2) years or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace and/or repair and any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SECTION 23 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GENERAL CONDITIONS

A. Before submitting a proposal, Bidders shall examine all related to this work and shall become fully informed as to the extent and character of the work required and its relation to the other work in the building.

B. Before commencing work, the Contractor will examine all conditions of the project upon which his work is in any way dependent for perfect workmanship according to the intent of this Specification. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed by this Contractor and acceded to by the Owner's representative in writing before the Contractor begins any part of the work.

C. The Contractor will pay for all licenses, permits and inspection fees required by civil authorities having jurisdiction. Comply with all laws, ordinances, regulations, and fire underwriter’s requirements applicable to work herein specified without additional expense to the Owner. (Also building code requirements).

D. It is specifically intended that anything (whether material or labor), which is usually furnished as a part of such equipment, as is hereinafter called for (and which is necessary for the completion and proper operation) shall be furnished as part of this Contract without additional cost the Owner, whether or not shown in detail or described in the Specifications.

E. When Drawings and Specifications conflict or there is a question as to the proper intent of this Contract, the Contractor shall assume the greater quantity, the higher quality and/or the more expensive method in his pricing. All questions shall be directed to the Architect/Engineer in writing only and only up to ten (10) days prior to bidding.

F. The Drawings indicate the general runs of the piping, ductwork, etc. systems and the location of equipment and apparatus, however it shall be understood that the right is reserved by the Architect/Engineer to change the location of piping work, ductwork, equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

G. Small scale drilling through walls and floors or cutting of piping insulation which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working of the project. This shall also apply to removal of piping, ductwork or equipment insulation.

H. Any changes from the Drawings and Specifications and any interpretation thereof shall have the prior approval of the Architect/Engineer. The Contractor shall submit in writing, at the time of signing the Contract, any items of necessary labor and materials, which, in his opinion, are lacking in requirements of the Drawings and Specifications to insure a complete job in all respects. No consideration will be granted to alleged misunderstanding of materials to be furnished, work to be done, or conditions to be complied with, it being understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying Drawings.

END OF SECTION

SECTION 23 0110

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

A. This Contractor shall refer to Section 01 6190 “Matrix of Building System Responsibilities” for additional information for all Building System installations.

B. The work under this section includes all labor, materials, equipment, tools, transportation, and the performance of all work necessary and required for the furnishing and installation complete of all work as shown on the Contract Documents, including but not necessarily limited to the following:

C. General

1. Rigging of equipment.

2. Furnish all combination motor starter/disconnects for equipment (with the exception of starters and electric items already mounted on equipment or equipment not requiring same). Fan motor starter/disconnects shall have contacts for ATC connection and a terminal block connection for Fire Alarm fan shutdown. Starters per manufacturer’s recommendations. Underwriter’s inspection and certificate required. Coordinate with Electrical Contractor.

3. Air, water and Steam System Balancing.

4. Automatic temperature controls with complete wiring (regardless of voltage).

5. Testing, adjusting and start-up of equipment.

6. Painting and identification of all equipment and piping.

7. Firestopping per NFPA requirements (UL approved systems).

8. Operating and maintenance instructions.

9. As-Built Drawings - Refer to Division 1.

10. Cutting and Patching - Refer to Division 1.

11. Coordination Drawings: Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both “time” and “money”.

12. Commissioning: Attention is directed to Division 23, Section 230485 for coordination with Commissioning Authority for this project.

13. Removal of existing HVAC equipment as indicated on Contract Drawings.

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1. Indoor energy recovery unit and related appurtenances.
2. Exhaust Fans and related appurtenances.
3. Steam to hot water heat exchanger and related appurtenances.
4. Variable frequency drives.
5. Baseboard fin tube and related accessories.
6. Sheetmetal ductwork and related accessories.
7. Duct and pipe insulation.
8. Registers, diffusers and dampers.
9. Outdoor condensing units.
10. Hot water and steam distribution piping, valves and appurtenances.
11. Duct-mounted hot water heating coils.
12. Refrigerant piping and appurtenances.
13. Conventional Ductless split and VRF systems, and related appurtenances.
14. Convectors, cabinet and unit heaters.
15. Dampers and related accessories.
16. Hot water circulation pumps and appurtenances.
17. Outdoor packaged ventilation units.
18. Inspection, cleaning and lining of existing chimney.
19. Unit ventilators and appurtenances.
20. Gas-fired rooftop units and appurtenances.
21. Steam condensate tank extension and appurtenances.
22. Engine exhaust riser from fire pump to roof.

1.2 WORK UNDER OTHER CONTRACTS

A. Power wiring of motors and equipment.

1.3 REMOVALS

A. Removals should be coordinated with other trades affected.

B. Piping which penetrates the construction may be cut and capped provided capping is done beneath the finished surfaces so that construction over it can be achieved.

C. All removals shall be removed from the site.

1.4 ALTERATION WORK

A. All equipment, piping, control components, etc. to be removed, shall be disposed of or salvaged as directed by the Owner. They shall not be removed from the premises without the Owner's approval.

B. All piping to be removed shall be properly plugged or capped so that upon completion of all new work, all abandoned piping shall be concealed in finished areas.

C. No dead ends shall be left on any piping upon completion of job. The existing system shall be left in perfect working order upon completion of new work.

D. Location and sizes of existing piping, ductwork, equipment, etc. are approximate. Exact sizes and locations of all existing work shall be verified on the job.

END OF SECTION

SECTION 23 0140

DIESEL ENGINE EXHAUST

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DIESEL ENGINE EXHAUST

A. Provide factory built exhaust system that is tested and listed by the Underwriters' Laboratories, Inc. for use with medium heat equipment burning liquid fuels, as described in NFPA-37 and NFPA-211, which produce exhaust flue gas temperatures not exceeding 1400°F under continuous operating conditions. Additionally, the vent system shall be U.L. 103 positive pressure tested and listed to 60 inches internal water column pressure. Design Basis: Selkirk IPS Exhaust Pipe, or equal.

B. The U.L. listed fiber insulated exhaust system shall have skin temperatures that have been obtained by Underwriters Laboratories (UL) test procedures. The published surface temperatures shall be the result of the UL103 1000° Fahrenheit chimney test.

C. The double wall exhaust system shall have a 304 stainless steel inner liner (20 ga minimum) and an aluminized steel outer jacket (24 ga minimum). The materials and construction of the modular sections and accessories shall be as specified by the terms of the product's U.L. listing.

1. Ceramic fiber insulation between the inner liner and outer jacket shall be a nominal four (4) inches thick.

D. Aluminized steel surfaces exposed to the elements shall be protected by a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the given application. All primer and paint to be supplied by the installing contractor and shall be equivalent to series V2100 as manufactured by Rust-Oleum. Alternatively, an outer jacket constructed of 304 or 316 stainless steel may also be considered in lieu of painting.

E. This exhaust system shall be designed and installed to be gas tight and thus prevent leakage of combustion products into a building.

F. Inner pipe joints shall be securely connected and sealed with factory supplied over-lapping V-bands and appropriate sealant as specified in the manufacturer's installation instructions.

G. Connections to silencers and expansion joints shall be made with matching flanges. Matching flanges shall be of the same size, bolt hole spacing and pressure rating as the flanges to which the connections are made.

H. Roof penetrations shall be suitable for the specified roof construction and shall comply with the manufacturer's installation instructions.

I. The exhaust system shall be designed to compensate for all flue gas induced thermal expansion.

2.2 WARRANTY

A. The exhaust system shall be warranted against functional failure due to defects in material and manufacturer's workmanship for a period of 15 years from date of installation.

B. The inner diameter of the exhaust system shall be verified by the manufacturer's computations. The computations used shall be technically sound, follow ASHRAE calculation methods and shall incorporate the specific flow characteristics of the inner pipe. The contractor shall furnish the exact operating characteristics of the engine(s) and muffler(s) to the factory representative.

C. The manufacturer shall provide "to scale" drawings depicting the actual layout. The exhaust system shall be installed as designed by the manufacturer and in accordance with the terms of the manufacturer's warranty and in conjunction with sound engineering practices.

D. The factory built modular exhaust system shall be furnished by a vendor organization that assures design, installation and services coordination. As well as, providing "in-warranty" and "post-warranty" unified responsibility for owner, architect, consulting engineer and contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inner pipe joints shall be sealed by use of factory supplied overlapping V bands and sealant as specified in the manufacturer's installation instructions.

B. Roof penetrations shall be suitable for a noncombustible roof and shall be according to the manufacturer's detail drawings and installation instructions

C. When installed according to the manufacturer's installation instructions, the exhaust piping and its supporting system shall resist side loads at least 1.5 times greater than the weight per foot of the piping for both horizontal and vertical portions of the system.

D. The exhaust system shall be installed according to the manufacturer's installation instructions and shall conform to all applicable state and local codes.

E. Provide all supports, guides, bellows type expansion joints, pressure relief/explosion relief valves, guy sections, guy tensioners, floor and roof thimbles, roof flashings, storm collars, moisture drains, and flip top terminations as required to provide a complete system per the manufacturer's installation instructions.

F. The entire exhaust system from the muffler discharge to the termination point, including all accessories, except as noted, shall be from one manufacturer. The exhaust system shall be installed and designed by the manufacturer and in accordance with the terms of the manufacturer's warranty, and in accordance with sound engineering practices.

END OF SECTION

SECTION 23 0160

HOT WATER HEATING CONVERTER

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 HOT WATER HEATING CONVERTER

A. The hot water heating converter shall be a Bell & Gossett type, or equal, Model no. "SU", 2 or 4 pass with a capacity as scheduled with a 2 psig steam. The maximum water pressure drop shall be 5.0 ft. with maximum overall length of 60 inches and minimum heating surface of 148 sq. ft.

B. Bolting: Alloy Steel, Supporting Cradles: Steel

C. Submit complete shop drawings of heat exchanger, structural frame support and piping for approval.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0190

PUMPS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 FLOOR MOUNTED PUMPS OR BASE MOUNTED PUMPS

A. The pumps shall be as manufactured by Shipco Pump, Model AW or approved equal with performances noted on the Drawing schedule.

B. The pumps shall be single stage; vertical split case design in cast iron and bronze construction. The pump's internals shall be capable of being serviced without disturbing piping connections or motor. The impeller shall be of the enclosed type, dynamically balanced and keyed to shaft and secured with a suitable locknut.

C. Pump seal shall be standard single mechanical seal with carbon seal ring and Remite (or equal) seat. A replaceable shaft sleeve shall be furnished to cover the wetted area of the shaft under the seal of packing.

D. The bearing frame assembly of the pump shall be fitted with re-greaseable ball bearings equivalent to electric motor bearing standards for quiet operation. The pump and motor shall be mounted on a common base plate of heavy structural steel design with securely welded cross members and open grouting area.

E. The pumps shall be factory tested at the operating conditions, thoroughly cleaned and painted with one coat of machinery enamel prior to shipment. A set of installation instructions shall be included with the pump at the time of shipment.

2.2 DUPLEX CONDENSATE UNIT (ACCESSORIES ARE UNDERLINED)

A. Furnish and install duplex condensate units as manufactured by Shipco Pump, Type DC or approved equal with performances noted on the Drawings. Each unit shall consist of one (1) steel receiver, two (2) water pumps, two (2) float switches and all accessories as hereafter specified.

B. The condensate receiver shall be of steel construction (warranted for 20 years from date of shipment against failure due to corrosion), and shall be furnished with: two (2) externally adjustable 2-pole float switches, water level gauge, dial thermometer, two (2) pressure gauges for pump discharge, two (2) bronze fitted, butterfly isolation valves (up to 73 gpm pump capacity) between pump suction and receiver and two (2) lifting eye bolts. Receiver shall be sized for 2 minute net storage based upon the system return rate. Receiver shall have an inlet, vent and an overflow opening to provide means of secondary venting.

C. A cast iron inlet with vertical self-cleaning bronze screen and large dirt pocket shall be mounted on the receiver. The screen shall be easily removable for cleaning, requiring no additional floor space for servicing.

D. The water pumps shall be two-stage, centrifugal design permanently aligned and flange mounted for vertical operation. Each pump shall be bronze fitted with enclosed bronze centrifugal impeller, axial flow bronze first-stage impeller, bronze straightening vanes, renewable bronze case ring and stainless steel shaft. Mechanical seals shall be suitable for 250 degree F. operation. Each pump shall be close-coupled to a 3,500 rpm vertical, drip-proof motor and shall deliver its full capacity with condensate temperatures up to 210 degrees F. at sea level, at 2 ft. NPSH (Net Positive Suction Head). Capacities and electrical characteristics for the pumps shall be as scheduled on the Drawings. Each pump gpm shall be sized for 2 times the system return rate.

E. Unit manufacturer shall furnish, mount on the unit and wire a NEMA-2 control cabinet with piano hinged door enclosing the following:

1. 2 - Combination magnetic starters (each having 3 overload relays) with fused disconnects and cover interlocks.
2. 1 - Electrical alternator.
3. 2 - "Auto-Off Hand": selector switches.
4. 1 - Numbered terminal strip.
5. 1 - Fused control circuit transformer for each circuit when the motor voltage exceeds 230 volts.

F. All Control Cabinets components shall be U.L. Listed or recognized components. The control panel assembly shall be listed by Underwriters Laboratories, Inc.

G. Each pump control circuit shall be completely independent of the other. The electrical alternator shall (1) change of operation sequence automatically after each cycle, (2) provide simultaneous operation under peak load conditions and (3) operate the second pump automatically, should the active pump or its controls fail.

H. All factory installed wiring shall be numbered for easy identification and the numbers shall coincide with those shown on the wiring diagrams. All interconnecting wiring between the pump, controls and control panel shall be enclosed in liquid tight flexible conduit.

I. The unit shall be factory tested as a complete unit and the manufacturer shall furnish complete elementary and connection wiring diagrams, piping diagrams, installation and operation instructions. The unit shall be shipped completely assembled.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0200

HYDRONIC SPECIALTIES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 AIR VENTS

A. Install at all high points automatic air vents to eliminate air binding. All automatic air vents shall be approved heavy duty type equipped with petcocks and tubing for manual venting. All vents installed in coils, etc. shall be of manual key operated type.

B. All vents concealed from view shall be accessible through access doors. Vents shall be by Hoffman, Anderson or ITT Bell & Gossett, 125 psig rated.

2.2 PRESSURE GAUGES

A. Furnish and install pressure gauges on suction and discharge sides of each pump and as required to check operation of equipment; pressure gauges shall have 4-1/2" diameter dials, Ashton, Ashcroft or approved equal.

2.3 THERMOMETERS

A. Install thermometers at all locations in piping system as noted on Drawings and as required to check system performance. Thermometers shall be installed at the supply and return of coils and 3-way diverting valves as manufactured by Trerice, Weksler or Moeller, with 4-1/2 inch face, cast aluminum case, chrome plated steel ring, white background with black embossed markings, glass window, stainless steel pointer, brass movement, 316 stainless steel bulb. Provide separable, universal angle sockets for all thermometers.

2.4 COMBINATION BALANCING / SHUT-OFF VALVES (Circuit Sensors /Setters and Flow Meters)

A. Provide where shown on Drawing Circuit Sensor/Setter balance valves as manufactured by Bell & Gossett or approved equal. Refer to details on Drawings.

B. Circuit Sensors: Furnish and install as shown on Drawings, a cast iron wafer-type flow meter designed for low pressure drop operation.

1. The flow meter will be equipped with brass readout valves (with integral check valve) for taking differential pressure readings across the orifice of the flow meter.

2. The flow meter shall be designed to operate at a maximum working pressure of 300 psig at 250 degrees F.

3. The flow meter must be furnished with a calibrated nameplate for determining an accurate system flow rate.

4. Each flow meter shall be ITT Bell & Gossett Circuit Sensor Flow Meter model no. OP.

C. Circuit Setters: Furnish and install as shown on Drawings and with manufacturer's recommendations model no. CB calibrated balance valves.

1. Valves to be designed to allow installing Contractor to pre-set balance points for proportional system balance prior to system start-up.

2. All valves 1/2 inch to 3 inch pipe size to be of bronze body/brass ball construction with glass and carbon filled TFE seat rings.

3. Valves to have differential pressure read-out ports across valve seat area. Read-out ports to be filled with internal EPT inert and check valve.

4. Valve bodies to have 1/4 inch NPT tapped drain/purge port.

5. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve settings. Valves to be leak-tight at full rated working pressure. Valves 4 inch pipe size to be of cast iron body/brass vane construction with differential pressure read-out ports fitted with internal EPT insert and check valve.

D. Readout Meters: Provide a portable Readout Meter with provision for hanging, capable of indicating pressure differential across a system component. Unit to be complete with all necessary hoses, shut-off and vent valves and carrying case. Reading range to be .5' to .16'. Readout Kits to be ITT Bell & Gossett model no. RO-3.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0210

STEAM AND STEAM CONDENSATE SPECIALTIES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SECTION INCLUDES

A. Steam traps.

B. Steam air vents.

C. Pressure reducing valves.

D. Steam safety valves.

1.2 REFERENCES

A. ASME - Boiler and Pressure Vessel Codes, SEC 8-D - Rules for Construction of Pressure Vessels.

B. ASME B31.9 - Building Services Piping.

C. ASTM A105 - Forgings, Carbon Steel, for Piping Components.

D. ASTM A126 - Grey Iron Casings for Valves, Flanges, and Pipe Fittings.

E. ASTM A216 - Steel Casings, Carbon, Suitable for Fusion Welding for High Temperature Service.

F. ASTM A395 - Ferric Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volt Maximum).

H. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Use Float and Thermostatic Traps for: Low pressure drips, medium and low pressure condensate drainage of modulating type equipment.

B. Use Inverted Bucket Steam Traps for: High and Medium pressure drips, high pressure condensate drainage.

C. Use thermostatic steam traps for various radiation types.

1.4 PERFORMANCE REQUIREMENTS

A. Steam Traps

1. Select to handle minimum of two times maximum condensate load of apparatus served.

2. Pressure Differentials

   a. Low Pressure Systems (15 psi maximum): 2 psi.
   b. Medium Pressure Steam (60 psi maximum): size tarp to yield 20 psig outlet pressure.
   c. High Pressure Steam (150 psi maximum): Traps discharging to medium pressure system shall be sized for 50 psig outlet pressure. Traps discharging to low pressure system shall be sized for 20 psig outlet pressure.

1.5 SUBMITTALS

A. Submit under provisions of Contract requirements.

B. Product Data: Submit Product Data for manufactured products and assemblies required for this project.

1. Provide for manufactured products and assemblies required for this project.
2. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes and finishes.
3. Submit schedule indicating manufacturer, model number, size, location rated capacity, load served and features for each specialty.
4. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Indicate application, selection and hookup configuration. Include pipe and necessary elevations.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Contract.

B. Operation and Maintenance Data: Include installation instructions, servicing requirements and recommended spare parts lists.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with New York State standards for installation of boilers and pressure vessels.

B. Maintain one copy document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.9 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of steam and steam condensate piping and specialties.

B. Product Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose intended.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Contract.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing section of the work, and isolating parts of completed system.

1.11 EXTRA MATERIALS

A. Provide two service kits for each size and type of steam trap.

PART 2 - PRODUCTS

2.1 INVERTED BUCKET TRAPS

A. Manufacturers

1. Armstrong
2. Other acceptable manufactures offering equivalent products.
   a. Spirax/Sarco, Inc.
   b. Dunham

B. Trap

1. Construction: ASTM A126, cast iron body with bolted cover, stainless steel bucket, stainless steel bucket, stainless steel seats and plungers and stainless steel lever mechanism with knife edge operating surfaces.

2. Rating: 250 psig WSP.

3. Features: Access to internal parts without disturbing piping, top test plug, bottom drain plugs.

4. Accessories: Integral inlet strainer of stainless steel, integral inlet check valve, integral bimetal air vent.

2.2 FLOAT AND THERMOSTATIC TRAPS

A. Manufacturers

1. Spirax/Sarco, Inc.

2. Other acceptable manufactures offering equivalent products.

   a. Mueller
   b. Dunham

B. Trap

1. Construction: ASTM A126, cast iron body with bolted cover, stainless steel or bronze bellows type air vent, stainless steel or copper float, stainless steel lever and valve assembly.

2. Rating: 125 psig 150 psig 300 psig WSP.

3. Features: Access to internal parts without disturbing piping bottom drain plug.

4. Accessories: Gauge glass with shut-off cocks.

2.3 THERMODYNAMIC TRAPS

A. Manufacturers

1. Armstrong

2. Other acceptable manufactures offering equivalent products.
   a. Spirax/Sarco, Inc.
   b. Dunham

B. Trap

1. Construction: Stainless steel body, disc and cap.

2. Rating: 300 psig.

3. Features: Stainless steel insulating cap 1/4" steel blow down valve, integral strainer.

2.4 THERMOSTATIC TRAPS

A. Pressure Balanced

1. Manufacturers
   a. Spirax/Sarco, Inc.
   b. Mueller
   c. Armstrong

2. Trap: ASTM A395 cast iron body and bolted or screwed cover for 125 psig or 300 psig WSP; as required to suit pressures, stainless steel bellows, stainless steel valve and seat; integral stainless steel strainer.

2.5 STEAM AIR VENTS

A. 125 psig WSP

1. Manufacturers
   a. Spirax/Sarco, Inc.
   b. Mueller
   c. Armstrong

2. Balanced Pressure Type: Cast brass body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

B. 225 psig WSP

1. Manufacturers
   a. Spirax/Sarco, Inc.
   b. Mueller
   c. Armstrong

2. Balanced Pressure Type: ASTM A126 cast iron body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

2.6 PRESSURE REDUCING VALVES

A. Manufacturers

1. Leslie
2. Spirax/Sarco

B. Steam pressure reducing valves have an accuracy of regulation equal to 1-psi and allow for variation of the set pressure while in service.

C. Valve shall be Leslie Cast Iron Body Globe Valve with braided Teflon graphite packing. End connections shall be Class 250 flanged. Body/bonnet material shall be cast iron. Trim shall be stainless steel Stellited. Les-Sonic cage shall be provided. Plug material shall be AISI 410 with PTFE seal. Gasket material shall be filled type 304 Stainless Steel. Seat ring material shall be AISI type 400 Stainless Steel, Stellited. Cage material shall be ASTM A-743 Gr. CA 40 St. Stem material shall be AISI type 316. Design temperature and pressure shall be 250 psig / 400º F.

2.7 SAFETY RELIEF VALVES

A. Manufacturers

1. Spirax/Sarco, Inc.
2. Other acceptable manufactures offering equivalent products.
   a. Armstrong
   b. Kunkler

B. Steam safety valves shall have set pressures and rated capacities as shown in the schedules. Safety valves should be based on the capacity of the PRV under wide open or maximum flow conditions, or the flow capacity through the valve bypass, whichever is greater.

C. Safety valves for unfired vessels shall be selected for 90% basis, 10% accumulation in accordance with ASME unfired pressure vessel code. Section VIII. Valves for power boilers shall be selected for 90% basis, 3% accumulation in accordance with ASME code, Section I and shall be stamped. Relief valves shall carry ASME code symbol and be rated for 250 psig SWP.

D. Safety valves shall be fitted with enclosed spring and external lifting lever. Furnish with manufacturer's standard connections and valve bodies of either bronze or cast iron with internals of brass or stainless steel.

E. Drip pan elbows for use with safety valve shall be cast iron rated in accordance with ASTM A126 Class B and be of the same size as the safety relief outlet or larger. Pipe as shown on Drawings.

F. All risers shall have drip pan elbows and the riser pipe after the drip pan elbow shall be unrestricted and larger than the drip pan outlet size. Ensure that all safety valve and drip pan elbow discharge is routed to a safe vent or drain.

PART 3 - EXECUTION

3.1 INSTALLATION OPERATION

A. Install specialties in accordance with manufacturer's instructions.

B. Steam Traps

1. Provide minimum 3/4” size on steam mains and branches.

2. Install with union or flanged connections at both ends.

3. Provide gate valve and strainer at inlet and gate valve, check valve at discharge.

4. Provide minimum 10” long, line size dirt pocket between apparatus and trap.

C. Remove thermostatic elements from steam traps during temporary and trial usage, until system has been operated and dirt pockets cleaned of sediment and scale.

D. In high pressure and medium pressure mains, provide 3/4” nipple in bottom of main, extending 3/4” into and above bottom of pipe. Provide dirt pocket with 1/2” high pressure thermostatic trap.

END OF SECTION

SECTION 23 0225

FAN COIL UNITS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Horizontal, 2 pipe, room fan coil unit with furred-in, above ceiling cabinet for ducting, as manufactured by Carrier Corp.

1.2 QUALITY ASSURANCE

A. Unit shall be tested and certified in accordance with ARI Standard 440 and base unit UL certified. (Units with special features may not have UL certification.) Each coil shall be factory tested for leakage at 300 psig air pressure with coil submerged in water. Insulation and adhesive shall meet NFPA-90A requirements for flame spread and smoke generation. All equipment wiring shall comply with NEC requirements.

1.3 DELIVERY, STORAGE AND HANDLING

A. Each unit shall be individually packaged from point of manufacture. Unit shall be handled and stored in accordance with the manufacturer's instructions.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General:
Factory-assembled, horizontal, blow-thru type fan coil for furred-in, exposed ceiling or ducted installations. Unit shall be complete with water coil(s), fan(s), motor(s), drain pan, and all required wiring, piping, controls and special features.

B. Base Unit

1. Casing shall be galvannealed steel, lined on the inside with 1/2-in. thick fiberglass insulation, with a one-inch long collar for supply duct connection.

2. The drain pan shall be constructed of galvannealed steel extending the entire length and width of the coil(s) and shall be pitched for drainage. The in-side surface of the drain pan shall be coated with closed-cell fire-retardant foam insulation. An extension drain pan shall be provided for installation under factory-provided water valves at the job site.

3. Plenum section shall be factory installed with throwaway filter as shown on equipment drawings. The plenum shall be bottom or rear air return, shall enclose the fan/motor assemblies, and shall be lined with 1/2-in. fiberglass insulation. Unit shall have a removable panel to provide access to fan/motor assemblies and unit identification label.

C. Fans:
Direct-driven, double-width fan wheels with forward-curved blades shall be statically and dynamically balanced. Scrolls shall be constructed of galvanized steel. Fan wheels shall be constructed of galvanized steel.

D. Coils:
Standard base unit shall be equipped with a 3-row or 4-row coil for installation in a 2-pipe system. Coils shall have 1/2-in. copper tubes, aluminum fins bonded to the tubes by mechanical expansion, and a working pressure of 250 psig. Each coil shall have a manual air vent and sweat connections for 5/8-in. OD copper tubes.

E. Controls and Safeties:
Unit shall be furnished with a 3-speed, 4-position fan switch on a wall plate for field mounting. The fan motor(s) shall be equipped with integral automatic temperature reset for motor protection.

F. Operating Characteristics:
A one-coil unit installed in a 2-pipe system shall be capable of providing heating or cooling as determined by the operating mode of the central water supply system. A double-circuit coil unit installed in a 4-pipe system shall be capable of providing sequenced heating and cooling.

G. Electrical Requirements:
Standard unit shall operate on 120 v, single-phase, 60 Hz electric power. All internal wiring shall be in flexible conduit.

H. Motor(s):
Fan motors shall be 3-speed, 120 v, single-phase, 60 Hz, permanent split capacitor type, with sleeve type bearings and oversized oil reservoirs to ensure lubrication.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0230

UNIT VENTILATORS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. General Specifications

1. The unit shall be a floor or ceiling mounted (as indicated on drawings) hot water heating ventilator as manufactured by the MagicAir, of model numbers and capacities noted on the drawing schedule. All access and maintenance shall be through the front of the unit.

2. The unit shall be constructed in accordance with ETL and CSA standards, and a label shall be affixed to the unit listing the product code under which it is registered.

3. The unit shall be a product of ISO: 9001 quality control program and be fully assembled and tested prior to shipment.

4. The units' noise criteria shall not exceed 40 Dba.

B. Unit Construction

1. Unit must be constructed of heavy 14 gauge steel components welded together to form a rigid frame that is suitable for rigorous classroom duty. Unit frames that are not welded together are not acceptable. Unless painted for cosmetic reasons, the frame shall be entirely of pre-galvanized material to prevent corrosion.

2. Exterior panels must be constructed of heavy gauge pre-galvanized steel that have been cleaned and pretreated prior to painting to afford the maximum corrosion resistance possible, even after scratches that might appear during normal use. These panels shall be coated with at least 2 mil of the highest quality polyester baked-on textured powder paint.

3. Unit top plenum shall be constructed of heavy gauge pre-galvanized steel coated with a texture finish baked-on powder paint to resist both corrosion and marring during normal use. Top shall extend to existing ceiling.

4. Units shall be constructed such that normal unit operation is not affected by removal of front panels for routine maintenance or troubleshooting/adjustments of control components. Units requiring all front panels to be installed for correct unit operation shall not be accepted.

C. Insulation: The standard unit shall be constructed such that there shall be no fiberglass in the airstream.

D. Drain Pan: Drain pans shall be furnished on all units and be constructed of heavy gauge galvanized material. Pans shall be insulated to ensure that they do not sweat during the cooling season. Drain stubs shall be copper at least 7/8" O.D. Both left and right hand stubs shall be furnished on all units. Construction shall be field reversible.

E. Motors

1. Fan Motor: Units shall be furnished with a thermally protected permanent split capacitor motor for maximum efficiency. Unit shall have at least two speeds selectable from a switch located on the front of the unit control box. Motor speed shall be provided by means of a multi-tap autotransformer that is used to control the voltage of the main winding of the motor.

2. Unit shall be equipped with factory mounted, toggle type, disconnect service switch.

F. Fans

1. Fans shall be large diameter (at least 8") for low speed, quiet operation and shall be constructed of high impact mineral filled polymer material. Fans must be mounted on a continuous, precision ground hollow shaft that is supported on one end by a long life bronze bearing and connected to the motor shaft by a coaxial steel coupling with resilient inner ring.

2. Motors shall be PSC three-speed type. The mount shall be mechanically isolated from the frame of the unit by the resilient bushings at each mounting point of the motor mount assembly.

G. Outdoor Air Dampers

1. Outdoor air and return air dampers shall be constructed of heavy gauge extruded aluminum for maximum strength and corrosion resistance. The damper shall be constructed such that its cross section forms a rectangle that affords maximum rigidity. Seals shall be neoprene material on all edges. The damper shafts shall pass through trouble-free nylon bearings and be attached to the damper using through bolts and vibration resistant nuts.

2. The damper must be insulated with fiberglass insulation sandwiched inside the section. Provide cold weather damper for maximum cold weather protection.

H. Face and Bypass Damper:

Face and bypass dampers must be constructed of heavy gauge aluminum material that has been stiffened by use of multiple components to form a cross section that forms a rectangle to afford maximum rigidity. Seals shall be dual durometer vinyl material of multiple leaf design to ensure minimal leakage. Damper shafts shall pass through trouble-free nylon bearings and be connected to the damper blade using multiple fasteners that utilize vibration resistant components for maximum trouble-free life.

I. Agency Listings:

All units shall be listed by NRTL (Nationally Recognized Testing Laboratory) such as ETL. All units shall have certified performance under applicable ARI program(s) for unit ventilators. The manufacturer shall furnish proof of such certification prior to final approval of the product.

J. Hot Water Coil

1. Coil shall be aluminum plate fin and copper tube construction. Coil shall be suitable for 150 psi working pressure. Coil shall be provided with an accessible manual air vent at the high point of the coil and a drain plug at the low point of the coil.

2. Contractor shall provide all necessary balancing valves, shutoff valves and union connections in both the supply and return piping connections to permit removal of the unit from the wall sleeve for servicing.

3. Coil shall be controlled by a modulating face and bypass damper. Coil shall have a 3-way, 2-position, end-of-cycle valve to shut off water flow when heating is no longer required. Valve and coil return shall have union connections. Valve shall be factory wired by the unit ventilator manufacturer and shall be field installed and piped by the installing contractor.

K. Filters

1. The units shall be furnished with throwaway filters. This filter shall be placed in the airstream such that all outdoor and/or return air passes through a single filter. Separate filtration of the outdoor air and return air are not acceptable.

2. Two (2) sets of spare throwaway filters are to be furnished by the manufacturer.

L. Temperature Controls:
The unit ventilator shall have a factory install DDC control package furnished by ATC Sub-Contractor.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0235

INDOOR ENTHALPY WHEEL ENERGY RECOVERY UNITS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. This specification is based on an Energy Recovery Units as manufactured by American Aldes Corp. Manufacturers of alternate equipment must be approved to bid via addendum, in writing by the specifying Engineer, at least two weeks prior to Bid time in order for their Bid to be accepted by the Contractor. If the equipment is not pre-approved then under no circumstances shall the Contractor invest any time or money in receiving submittals or considering the equipment. Costs associated with dimensional, performance or other deviations from the specified equipment, including engineering costs to evaluate such deviations, shall be paid by the Contractor.

B. The unit(s) shall be installed in strict accordance with the specifications. Unit(s) shall be complete with all components and accessories as specified. All units shall be factory assembled, internally wired, and 100% run tested to check operation, fan and blower rotation and control sequence before leaving the factory. Wiring internal to the unit shall be numbered for simplified identification. Units shall be ETL listed and labeled, classified in accordance with ANSI-UL 1995 / CAN/CSA C22.2 No.236.

1.2 QUALITY ASSURANCE

A. All unit(s) shall be factory tested before shipping. A proof copy of the test shall be placed in the unit control panel. Unit(s) shall bear the ETL label, tested in accordance to UL 1995. Electrical components shall be UL listed; fans shall be tested in an AMCA certified laboratory; insulation shall comply with NFPA 90A; coils shall be tested in accordance to ARI 410 and filters shall be tested in accordance to ASHRAE 52. The unit manufacturer shall have an independent testing agency test the air leakage, panel deflection and sound pressure levels for a typical unit providing at minimum the supply airflow of units in question and not exceeding 20,000 CFM. The air leakage of the unit(s) shall not exceed 1% at 8" inches H_2O positive static pressure and a copy of the report must be submitted upon request. Unit shall be constructed to limit frame and panel deflection to $1/200^{th}$ of the panel length at 8" inches H_2O positive static pressure and a copy of the report must be submitted upon request. The unit shall also be tested in accordance with ANSI S12.34-1998 and instrumentation used must be in compliance with the requirements of AMCA 300 for sound readings. The sound tests conducted shall report overall sound power and pressure readings for supply air outlet, return air inlet and casing radiated.

PART 2 - PRODUCTS

2.1 HOUSING

A. The unit housing shall be constructed from a frame, base and panel assembly. Unit shall be completely factory assembled and shipped in one piece. Frame shall be made from robust aluminum die cast corners and extruded aluminum profiles shall be welded together for reinforcement. The base structure shall be fully welded galvanized with cross members specifically positioned to allow for a complete walking type floor. Base structure shall have integral lifting lugs which can be removed once the unit is installed. All panels shall be made from G-90 galvanized steel, minimum 18-gauge. Fixed panels shall be fastened from the interior and gasketed to reduce thermal transmission.

B. Access doors shall be provided to all major components to facilitate quick and easy access. Each access door shall be latched with Ventlok latches, heavy duty aluminum butt hinges and designed to open against air pressure where indicated. Access doors shall be sealed with a full "U-Shaped" gasket for superior air tightness along the door edge. Bulb type gaskets shall not be acceptable since they do not return to their original form once compressed.

C. Fixed panels shall be removable without affecting the housing integrity. All panels and access doors shall be double wall construction with (R-4.3) one-inch thick or (R-8.6) two-inch thick, minimum 1.8 PCF fiberglass insulation and lined with 20-gauge G-90 galvanized. The airflow separation wall between the outside air intake and exhaust air outlet shall be insulated with the same insulation thickness as the exterior panels when the winter design temperature is below 35 F. All roof and sidewall seams shall be positively sealed to prevent water and air leakage.

2.2 ENTHALPY WHEEL

A. Enthalpy Wheel shall recover both sensible and latent heat. The matrix shall be constructed from corrugated aluminum and specifically treated and coated with Silica Gel desiccant to assist and enhance latent heat transfer. Any other type desiccants, including 3A or 4A Molecular Sieves, will not be accepted for HVAC applications.

B. Seals shall be full contact, low bleed type, made from dual band Ultra High Molecular Weight Polyethylene. Any seal that is non-contact is not to be considered a seal and will not acceptable. Labyrinth type seals do not operate properly under different air stream pressures therefore shall not be acceptable in any circumstances.

C. Drive system shall be operated by a fractional horsepower motor (maximum 1 HP), reducing gear-box, pulley and v-belt. The wheel bearing shall be permanently sealed and press fitted into the wheel matrix for long life operation. A double purge sector (2 x 5º) shall be factory installed to reduce cross contamination to under 0.1%.

D. Frost control prevention shall be accounted for if outdoor air temperatures are below 10 degrees F at equal airflows and return relative humidity below 30%. Frost control shall be accomplished by a variable speed drive and controlling the leaving air condition of the exhaust air. Other methods of frost control will not be considered for this application. Wheel speed shall not rotate faster than 20 rpm. Any rotational speed above 20 rpm will be unacceptable.

2.3 FANS

A. The fans shall be carefully positioned and installed at an optimal distance to respect uniform airflow across the heat exchanger and coil(s).

1. Scroll Fans: The fan housing shall be fully constructed from galvanized steel, with double width, double inlet and forward curved impellers for constant airflow applications below 3.5" TSP and airfoil impellers for VAV applications with greater than 3.5" TSP. Impeller wheels shall be staggered for reduced sound transmission. Painted housing shall not be acceptable. Fans shall be belt-driven with adjustable sheaves. Bearings shall be selected for an average life in excess of 200,000 hours at maximum cataloged operating speeds. Fan assembly shall be isolated from the unit housing and all fan wheels shall be statically and dynamically balanced for quiet operation. Fans shall be tested for Class I and II operating limits and rated in an AMCA certified laboratory.

2.4 FAN MOTORS

A. The fan motors shall meet NEMA standard dimensions and comply with the Energy policy Act of 1997. Motors shall have high efficiencies with low noise and vibration output. Motors shall be certified and built in accordance to ISO 9001 quality control system. Motors shall have Open Drip Proof enclosure with hi efficiency performance. Motors shall be designed for single speed application unless otherwise noted.

2.5 FILTERS

A. Filters shall be factory installed upstream of the heat exchanger and coils, in both airstreams. Filters shall be throwaway type with extended surface pleats to increase dust-holding capacity. Filters shall be 2`` thick, MERV 8 ASHRAE efficiency. Filters shall be placed in a completely sealed, galvanized holding frame with quick release latches for easy replacement. Maximum air velocity through filters shall be 500 FPM.

2.6 DAMPERS

A. Dampers shall be installed were shown on the drawings. Dampers shall be low leak type with rubber edges, opposed blades, and constructed in Aluminum. Damper actuators shall be 24V, two position or modulating type, with spring return mechanism and auxiliary switches.

2.7 COILS

A. Coils shall be are factory installed in the unit. Primary surface shall be round seamless (5/8" O.D.) copper tube on 1½" centers, staggered in the direction of airflow. Secondary surface shall consist of rippled aluminum plate fins for higher capacity and structural strength.

B. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.

C. Casing shall be constructed of continuous galvanized steel. Headers shall have intruded tube holes to provide a large brazing surface for maximum strength and inherent flexibility. The complete coil shall be tested with 315 pounds air pressure under warm water and be suitable for operation at 250 psig working pressures. Maximum finned coil height shall be 45" and shall not exceed 500 fpm face velocity. Stacked coils shall be provided for larger airflows and intermediate drain pans shall be provided for each coil bank.

D. Drain pans shall be stainless steel with drain connections on one side only. Pan shall be sloped in two planes. All coils shall be certified in accordance with ARI standard 410.

2.8 POWER AND CONTROL

A. The power and control center shall be integral to the unit housing and rated NEMA 4X. All wiring shall be accomplished by the manufacturer and must be tested under a high pot test. UNDER NO CIRCUMSTANCES SHALL ANY WIRING OR PARTS BE FIELD INSTALLED. Panels that are externally mounted to the unit shall not be accepted, regardless of the NEMA rating they may have. A separate access door shall be provided with an approved locking device. All electrical components contained in the panel shall be UL/CSA certified and labeled. The unit shall be complete with motor starters, fuses, cascading overloads, relays, terminal interface for ON/OFF and step-down transformer.

B. All components shall be factory wired for single point power connection by the manufacturer of the unit. A non-fused safety disconnect switch shall be factory installed for on/off servicing. Any power or control wiring that is field installed shall not be accepted under any circumstances. IF UNITS SHOW UP AT THE JOB SITE WITHOUT WIRING BY THE MANUFACTURER, THE CONTRACTOR WILL HAVE TO SEND BACK UNITS TO THE MANUFACTURER AT THE CONTRACTORS' EXPENSE TO GET THEM FACTORY WIRED AND RE-TESTED.

PART 3 - EXECUTION

3.1 FIELD INSPECTION

A. The manufacturer who is basis of design will reserve the right to field inspect the units, whether they are awarded the job or not, and shall provide a written report to the engineer noting any deficiencies to the bid specifications. If there are any deficiencies or missing items on the units shipped which are clearly mentioned in the bid documents, regardless of what is approved by the engineer on the submittals, the units shall be returned to the manufacturer for them to be corrected at the contractor’s expense.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0240

COMMERCIAL AIR-COOLED CONDENSING UNITS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Outdoor-mounted, air-cooled split system outdoor section suitable for on rooftop installation. Unit shall consist of a scroll compressor, an air-cooled coil, propeller-type blow-thru outdoor fans, accumulator, full refrigerant charge, and control box. Unit shall discharge air horizontally as shown on the contract drawings. Units shall function as the outdoor component of an air-to-air cooling and system.

B. Units shall be used in a refrigeration circuit matched to a ducted cooling coil.

1.2 QUALITY ASSURANCE

A. Unit construction shall comply with ANSI/ASHRAE 15, latest revision, and with the NEC.

B. Units shall be constructed in accordance with UL standards.

C. Units shall be listed in the CEC directory.

D. Unit cabinet shall be capable of withstanding Federal Test Standard No. 141 (method 6061) 500-hour salt spray test.

E. Air-cooled condenser coils shall be leak tested at 350 psig air pressure with the coil submerged in water.

1.3 DELIVERY, STORAGE AND HANDLING

A. Units shall be shipped in one piece and shall be stored and handled per unit manufacturer’s recommendations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, full charge of 410A refrigerant and special features required prior to field start-up.

B. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized-steel, bonderized and coated with a baked-enamel finish.

2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.

3. Outdoor compartment shall be isolated and have an acoustic lining to assure quiet operation.

C. Fans

1. Outdoor fans shall be direct-drive propeller type, and shall discharge air horizontally. Fans shall blow air through the outdoor coil.

2. Outdoor fan motors shall be totally-enclosed, single-phase motors with class B insulation and permanently-lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.

3. Shaft shall have inherent corrosion resistance.

4. Fan blades shall be corrosion resistant and shall be statically and dynamically balanced.

5. Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil.

D. Compressor

1. Compressor shall be scroll type.

2. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from overtemperature and overcurrent. Scroll compressors shall also have high discharge gas temperature protection if required.

3. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.

4. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation.

E. Outdoor Coil: Coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes which are cleaned, dehydrated, and sealed.

F. Refrigeration Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, accumulator, pressure relief, and a full charge of refrigerant.

G. Controls and Safeties: Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

1. Controls

a. Time delay restart to prevent compressor reverse rotation on single-phase scroll compressors.

b. Automatic restart on power failure.

c. Safety lockout if any outdoor unit safety is open.

d. A time delay control sequence provided through the fan coil board, thermostat, or controller.

e. High-pressure and liquid line low-pressure switches.

f. Automatic outdoor-fan motor protection.

2. Safeties

   a. System diagnostics.

   b. Compressor motor current and temperature overload protection.

   c. High pressure relief.

   d. Outdoor fan failure protection.

H. Electrical Requirements

1. Unit electrical power shall be a single point connection, as scheduled.

2. Unit control voltage to the indoor-fan coil shall be 24 v.

3. All power and control wiring must be installed per NEC and all building codes.

4. High and low voltage terminal block connections.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0250

PACKAGED ROOFTOP VENTILATION AIR UNITS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Unit is an outdoor, electrically controlled make-up air unit.

1.2 QUALITY ASSURANCE

A. All units must be:

1. ETL and CSA Certified for electrical safety in compliance with UL-1995 safety standard for heating and cooling equipment.

2. Compliant with FM (Factory Mutual) requirements.

B. Unit shall be rated in accordance with ARI Standards 210 (sizes 03-12). All units shall be designed in accordance with UL Standard 1995. Units shall be rated in accordance with ARI sound standards, 270 or 370.

C. Unit shall be designed to conform to ASHRAE 15.

D. Unit shall be UL and UL, Canada, tested and certified in accordance with ANSI Z21.47 Standards as a total package.

E. Roof curb shall be designed to conform to NRCA Standards.

F. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

G. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

H. Unit shall be manufactured in a facility registered to ISO 9001:2000.

I. Each unit shall be subjected to a completely automated run testing on the assembly line.

1.3 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled per manufacturer’s recommendations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Factory-assembled, single-piece cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge (R-410A), operating oil charge, dual refrigerant circuits, microprocessor based control system and associated hardware, and all special features required prior to field start-up.

B. Unit Cabinet

1. Double wall design, constructed of G-90 galvanized steel, bonderized and pre-coated with a baked enamel finish.

    a. Top cover shall be 18-gage sheet metal with 1.0-in. thick, 4.0-lb density, closed cell insulation with a 24-gage sheet metal interior liner.
    b. Access panels and doors shall be 20-gage sheet metal with 1.0-in. thick, 4.0-lb density, closed cell insulation with a 24-gage sheet metal interior liner. Access doors shall be equipped with stainless steel hinges and quarter turn, adjustable, cam-action latches.
    c. Corner and center posts shall be 16-gage galvanized steel.
    d. Base pans shall be 16-gage galvanized steel. All openings through the base pan shall have upturned flanges at least 0.5 inches in height.
    e. Basepans shall be insulated with 0.375-in. thick closed cell foam insulation.
    f. Compressor rail shall be 12-gage galvanized steel.
    g. Condensate pan shall be 16-gage stainless steel insulated with closed cell neoprene insulation.
    h. Base rail shall be 14-gage galvanized steel.
    i. Fan deck (indoor and outdoor section) shall be 16-gage galvanized steel.
    j. Roof sections shall be sloped for proper drainage.

2. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
3. Unit shall have insulated hinged access doors for easy access to the control box and other areas requiring servicing. Each door shall seal against a rubber gasket to help prevent air and water leakage and be equipped to permit ease and safety during servicing.
4. Interior cabinet surfaces shall be lined with 24 gage galvanized steel.
5. Unit shall have a factory-installed sloped condensate drain connection fabricated of stainless steel.
6. Unit shall be equipped with rigging openings in frame rails to facilitate overhead rigging.
7. Filters shall be accessible through a hinged access panel.
8. Unit shall have vinyl coated security grille to protect the condenser and compressor section.
9. The outdoor air opening shall have a factory-installed hood with bird screen.

C. Fans

1. Indoor Evaporator Fans

    a. Double-width/double-inlet, centrifugal, belt driven, forward-curved type with single outlet discharge.
    b. Fan shaft bearings shall be of the pillow block type with positive locking collar and are permanently lubricated.
    c. Fans shall be statically and dynamically balanced.
    d. Evaporator fan shaft bearings shall have a minimum L10 life of 30,000 hours.
    e. The fan assembly shall be mounted in rubber vibration isolators.
    f. Fan assembly shall be on a slide-out deck that is removable for maintenance and service.

2. Condenser Fans

    a. Fans shall be direct-driven propeller type only, with corrosion-resistant blades riveted to corrosion-resistant steel supports.
    b. Fans shall discharge air vertically upward and be protected by PVC coated steel wire safety guards.
    c. Fans shall be statically and dynamically balanced.

D. Compressors

1. Fully hermetic, scroll type compressors with overload protection and short cycle protection with minimum on and off timers.
2. Factory rubber-in-shear mounted for vibration isolation.
3. Reverse rotation protection capability.
4. Crankcase heaters shall only be activated during compressor off mode.

E. Coils

1. Standard evaporator coil shall have enhanced surface aluminum plate fins mechanically bonded to six rows of seamless internally grooved copper tubes with all joints brazed.
2. Standard condenser coil shall have enhanced surface aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
3. Coils shall be pressure tested at 650 psig prior to unit assembly; leak tested at 150 psig and undergo final testing at 475 psig.
4. Optional coil coatings for corrosion protection shall be available.

F. Refrigerant Components

1. Unit shall be equipped with dual refrigerant circuits, with each circuit containing:

    a. Solid core filter drier.
    b. Adjustable thermostatic expansion valve.
    c. Minimum load valve (hot gas bypass).
    d. Gage connection ports

2. Unit shall be equipped with fan cycling low ambient head pressure control to allow operation down to 35 F.

G. Filter Section: Standard filter section shall be supplied with 2-in. thick MERV-8 fiberglass filters.

H. Controls and Safeties

1. Microprocessor Controls

    a. Shall include a field-installed space temperature sensor with communication port.
    b. BACnet, Modbus, and LonWorks protocol capable.
    c. Shall provide a 5° F temperature difference between cooling and heating set points to meet ASHRAE 90.1, energy standard.
    d. Shall provide an alarm indicator and an audible alarm signal.
    e. Shall provide and display a current alarm list and an alarm history list.
    f. Compressor minimum run time (3 minutes) and minimum off time (5 minutes) shall be provided.
    g. Shall have service run test capability
    h. Shall have a service diagnostic mode.
    i. Minimum of 2 capacity stages (single circuit) or 3 capacity stages (dual circuit) of mechanical capacity control (excluding hot gas bypass) controlled with logic to maintain supply-air temperature set point.
    j. Unit shall be complete with self-contained low voltage control circuit.

2. Safeties

a. Unit shall incorporate a solid-state compressor lockout which provides optional reset capability at the space thermostat should any of the following safety devices trip and shut off compressor:
   1) Compressor lockout protection provided for either internal or external overload.
   2) Low-pressure protection.
   3) Freeze protection (evaporator coil).
   4) High-pressure protection.
   5) Loss of charge protection.

b. Supply-air sensor shall be located in the unit and shall be used for compressor stage control.

c. Unit shall be equipped with a supply fan status switch to protect the system in the event of a fan drive failure.

I. Operating Characteristics

1. Unit shall be capable of starting and running at 115^{O} F ambient outdoor temperature per maximum load criteria of AHRI Standard 340/360.

2. Unit with standard controls will operate in cooling down to an outdoor ambient temperature of 35^{O} F.

3. Units shall be equipped with a motorized two position outdoor air (OA) damper for 100% OA operation.

4. Units shall be equipped with an enthalpy control economizer.

J. Electrical Requirements: All unit power wiring shall enter unit cabinet at a single location.

K. Motors

1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.

2. All condenser-fan motors shall be open drip proof with permanently lubricated ball bearings, class F insulation and manual reset overload protection.

3. All indoor-fan motors 5 hp and larger shall meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT), effective October 24, 1997.

4. All indoor fan motors shall be open drip proof design.

L. Special Features: Certain features are not applicable when the features designated * are specified. For assistance in amending the specifications, contact your local Carrier Sales Office.

1. Hot Gas Reheat: A factory-installed hot gas reheat (HGRH) coil shall be available. The HGRH coil shall be available on the lead circuit only or on both refrigerant circuits. Units with HGRH will have variable speed low ambient head pressure control. Cycling or modulating HGRH shall be available.

2. Energy Recovery

   a. The factory-installed enthalpy wheel shall be certified to meet the requirements of AHRI Standard 1060 and shall be AHRI listed.
   b. The enthalpy wheel shall be constructed of corrugated synthetic fibrous media with a desiccant intimately bound and uniformly and permanently dispersed throughout the matrix structure of the media.
   c. The desiccant material shall be molecular sieve, 4 angstrom or smaller.
   d. The rotor shall be constructed of alternating layer of flat and corrugated media.
   e. Wheel construction shall be fluted or formed honeycomb geometry so as to eliminate internal wheel bypass.
   f. The wheel frames shall be evenly spaced steel spokes with a galvanized steel outer band and rigid center hub.
   g. The wheel seals shall be full contact nylon brush type.
   h. The wheel shall slide out of the cabinet side for service.
   i. Wheel cassettes shall be constructed of galvanized steel. Cassettes shall have integral purge section.
   j. The wheel bearings shall be inboard mounted, permanently sealed roller bearings or externally flanged bearings.
   k. The wheel shall be driven by a fractional horsepower AC motor via multilink drive belts.
   l. Energy wheel defrost control and air bypass shall be available.
   m. The wheel air carry-over from supply to exhaust shall be less than one percent at the wheel face with three to five inches of pressure differential between the airstreams.

3. Backward Inclined Plenum Supply Fan: A factory-installed backward inclined plenum fan shall be mounted on rubber isolation and installed on a slide-out deck that is removable for maintenance and service.

4. Modulating Supply Fan: Package shall include a VFD controlled supply fan mounted on rubber vibration isolation and installed on a slide-out deck that is removable for maintenance and service. VFD control shall be based on building pressure.

5. Liquid Subcooling Coil: The unit shall be equipped with a factory-installed liquid subcooling coil on all circuits.

6. Exhaust Fan: Package shall include an exhaust fan mounted on rubber vibration isolation with gravity relief damper. The shaft mounted fan shall be mounted in sealed ball bearings and driven via an adjustable sheave belt drive.

7. Modulating Exhaust Fan: Package shall include a VFD controlled exhaust fan mounted on rubber vibration isolation with gravity relief damper. The shaft mounted fan is mounted in sealed ball bearings and driven via an adjustable sheave belt drive. VFD control shall be based on building pressure.

8. Oversize Fan Motors: Oversize fan motors shall be available for both optional supply and exhaust fan motors.

9. Convenience Outlet: Shall be factory-installed and internally mounted with an externally accessible 115-v, 15 amp GFI, female receptacle with hinged cover. The outlet shall require field-supplied 115-v power supply wiring.

10. Non-Fused Disconnect Switch: Shall be factory-installed, internally mounted, and UL approved. Non-fused switch shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.

11. Firestat: A factory-installed, manual-reset firestat shall be mounted in the return air opening of the unit. The firestat shall be set to open at 135 F.

12. Dirty Filter Status Switch: The manual reset filter status switch shall be a pressure differential switch and will indicate a dirty filter. The switch shall be factory installed.

13. Fan Status Switch: The unit shall be equipped with a field-adjustable differential air pressure switch installed across the filters or supply fan to provide proof of airflow.

14. Phase/Voltage Monitor: A factory-installed under-voltage and phase loss sensor shall stop the unit whenever voltage is too low, phases are out of sequence, or a phase is dropped. The unit will restart automatically within five minutes after the correct power is supplied.

15. Spring Fan Isolation: Supply fan and power exhaust fan (if equipped) shall be mounted in spring type isolation with seismic restraints.

16. 4-Inch Filters: Filter section shall be supplied with 4-in. thick MERV-8, 11 pleated fiberglass filters.

17. Digital Compressor: A digital compressor shall be available. The control system shall be capable of unloading the compressor in an unlimited number of steps from 100% capacity down to 10% capacity.

18. Commissioning User Interface: The commissioning keypad/display unit shall have a numeric keypad, direction keys, and programmable function keys. Display shall be a 4 line by 40 character backlit LCD display.

19. Full Perimeter Roof Curb: Curb shall be formed of 14-gage galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0252

PACKAGED ROOFTOP ELECTRIC COOLING UNIT WITH GAS HEAT

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Unit is an outdoor, rooftop mounted, electrically controlled heating and cooling unit utilizing a reciprocating semi-hermetic compressor(s) for cooling duty and gas combustion for heating duty. Supply air shall be discharged horizontally, as shown on contract drawings. Standard unit shall include a manual outdoor-air inlet.

1.2 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standards 270 and 360 and designed in accordance with UL Standard 1995.

B. Unit shall be designed to conform to ASHRAE 15.

C. Unit shall be ETL-tested and certified in accordance with ANSI Z21.47 Standard as a total package.

D. Unit shall be certified by CETL.

E. Roof curb shall be designed to conform to NRCA Standards.

F. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

G. Unit casing shall be capable of withstanding Federal test method Standard No. 141 (Method 6061) 500-hour salt spray test.

H. Unit shall conform to ISO 9002 manufacturing quality standard.

1.3 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled per manufacturer’s recommendations.

PART 2 - PRODUCTS

2.1 EQUIPMENT (STANDARD)

A. General: The 48HJ unit shall be a factory assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted baked enamel finish.

2. Indoor blower compartment interior surfaces shall be insulated with a minimum 1/2-in. thick insulation coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment

3. Cabinet panels shall be easily removable for servicing.

4. Filters shall be accessible through an access panel.

5. Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging.

6. Unit shall have a factory-installed internal condensate drain connection and a sloped condensate pan.

C. Fans

1. Indoor blower (evaporator fan)

   a. Fan shall be belt driven. Belt drive shall include an adjustable pulley.
   b. Fan wheel shall be made from steel with a corrosion resistant finish. It shall be a dynamically balanced, double-inlet type with forward-curved blades.

2. Condenser fan shall be of the direct-driven propeller type, with corrosion-resistant blades riveted to corrosion-resistant steel supports. It shall be dynamically balanced and discharge air upwards.

3. Induced-draft blower shall be of the direct-driven, single inlet, forward-curved, centrifugal type. It shall be made from steel with a corrosion-resistant finish and shall be dynamically balanced.

D. Compressor(s)

1. The reciprocating semi-hermetic compressor(s) has factory-installed external spring vibration isolation.
2. Factory-installed crankcase heater prevents refrigerant dilution of oil.
3. The semi-hermetic compressor shall have unloading capability (015 only).
4. Shall be on independent circuits (017,025).

E. Coils: Standard evaporator and condenser coils shall have copper or aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.

F. Heating Section

1. Induced-draft combustion type with energy saving direct-spark ignition system and redundant main gas valve.

2. The heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.

3. Burners shall be of the in-shot type constructed of aluminum-coated steel.

4. All gas piping shall enter the unit at a single location.

G. Refrigerant Components - Refrigerant circuit components shall include:

1. Fixed expansion device with filter driers.
2. Service gage connection on suction, discharge, and liquid lines.
3. Suction and discharge service valves.

H. Filter Section: Standard filter section shall consist of 2 sizes of factory-installed 2-in. thick throwaway fiberglass filters of commercially available sizes.

I. Controls and Safeties

1. Unit Controls

a. Economizer control
b. Capacity control
c. Unit shall be complete with self-contained low-voltage control circuit.

2. Safeties

a. Unit shall incorporate a solid-state compressor lockout which provides reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:
- Compressor overtemperature, overcurrent.
- Low-pressure switch.
- Freezestat (evaporator coil).
- High-pressure switch.

b. Supply-air thermostat shall be located in the unit.

c. Heating section shall be provided with the following minimum protections:
- High-temperature limit switch.
- Induced-draft pressure switch.
- Flame rollout switch (manual reset).
- Flame proving controls.
- Redundant gas valve(s).

J. Operating Characteristics

1. Unit shall be capable of starting and running at 125 F ambient outdoor temperature, exceeding maximum load criteria of ARI Standard 360.
2. Unit with standard controls will operate in cooling to 35 F.
3. Unit provided with fan time delay to prevent cold air delivery.

K. Electrical Requirements

1. All unit power wiring shall enter unit cabinet at a single location.

L. Motors

1. The compressor motors shall be of the refrigerant-cooled type with thermal and calibrated circuit breaker overload protection.

2. All fan motors shall have permanently lubricated, sealed bearings and inherent automatic-reset thermal overload protection or manual reset calibrated circuit breakers.

M. Special Features

1. Roof Curbs

   a. Formed of 18-gage galvanized steel with wood nailer strip and capable of supporting entire unit weight.
   b. Allows for installing and securing ductwork to curb prior to mounting unit on the curb.
   c. Both horizontal and vertical supply/return curbs shall be available.

2. Integrated Economizer

   a. Integrated type capable of simultaneous economizer and compressor operation to provide cooling with outdoor air.
   b. Equipped with low-leakage dampers not to exceed 3% leakage, at 1.0 in. wg pressure differential.
   c. Capable of introducing up to 100% outdoor air.
   d. Equipped with dry-bulb temperature control to govern economizer changeover.

3. Accessory Compressor Cycle Delay:

   a. Compressor shall be prevented from restarting for a minimum of 5 minutes after shutdown.

4. Thermostat and Subbase:

   a. To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.

5. Barometric Relief Damper Package:

   a. Package shall include damper, seals, hardware, and hoods to relieve excess internal pressure.
   b. Damper shall close due to gravity upon unit shutdown.

6. Head Pressure Control Package:

   a. Consists of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor for controlling condenser-fan motor speed to maintain condensing temperature between 90 F and 100 F at low outdoor ambient temperature.

7. Differential Enthalpy Sensor:

   a. For use with economizer only.
   b. Capable of comparing heat content (temperature and humidity) of outdoor air and indoor air and controlling economizer cut-in point at the most economical level.

8. Electronic Programmable Thermostat:

   a. Capable of using deluxe full-featured electronic thermostat.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0255

VRF COMPACT IN-CEILING CASSETTE DUCTLESS UNITS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Indoor, in-ceiling mounted, direct-expansion fan coils are matched with a heat recovery VRF outdoor unit.

1.2 AGENCY LISTINGS

A. Unit shall be ETL listed and certified to UL 1995 4th edition standard.

1.3 DELIVERY, STORAGE AND HANDLING

A. Units shall be stored and handled per unit manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Indoor, direct-expansion, low profile (10.6 in.), compact (22.6 x 22.6 in) in-ceiling fan coil. Unit shall be complete with a coil, fan, DC inverter driven fan motor, PMV valve, piping connectors, electrical controls, microprocessor control system, integral temperature sensing, condensate pump with a lift capability of 24.7" (627.5 mm), and hanging brackets.

B. Unit Cabinet: Cabinet shall be constructed of zinc-coated steel. Fully insulated discharge and inlet grilles shall be attractively styled, high-impact non- metallic material. The inlet grille shall have hinges and can be opened to obtain access to the cleanable filters, indoor fan motor and control box.

C. Fans

1. Fan shall be centrifugal direct-drive blower type with air intake in the center of the unit and discharge at the perimeter. Automatic, motor-driven vertical air sweep shall be provided standard. Automatic motor-driven louvers shall be provided standard and shall be adjustable for 2, 3 or 4-way discharge.

2. Air sweep operation shall provide three user selectable modes.

D. Coil: Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion and specially coated for enhanced wet-ability. A drip pan under the coil shall have a factory installed condensate pump and drain connection for hose attachment to remove condensate. A replaceable element in the condensate disposal system provides antibacterial protection.

E. Motors: Motors shall be totally enclosed, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be inverter controlled variable speed.

F. Controls

1. The system shall be microprocessor controlled to maintain precise room temperature and minimum power consumption. The controls system shall employ a genetic algorithm for temperature control, and shall have an accuracy of 0.9 OF (+ 0.5 OC). The following user interface accessories shall be compatible with the unit.

   a. Building Management System:
   The system shall be able to be controlled by BACnet, or Lon Works either directly or through an external gateway. BACnet and Lon Works shall be able to control: ON / OFF, Operation mode, Fan speed, Louver, Set temperature, Permit / Prohibit of Local Operation. BACnet and Lon Works shall be able to monitor: ON / OFF, Operation mode, Fan speed, Louver, Set temperature, Permit / Prohibit of Local Operation, Room temperature, Error status, Error code.

2. The unit shall have the following functions as a minimum:

   a. Selectable automatic restart, after power failure the system will restart at the same operating conditions as before the failure.

   b. Temperature-sensing controls shall sense return air temperature at the unit or at the remote control.

   c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.

   d. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.

   e. Dehumidification mode shall provide increased latent removal through total system modulation.

   f. Fan-only operation to provide room air circulation when no cooling is required.

   g. Fan speed control shall be user-selectable: high, medium, low, or microprocessor determined (Auto) based on the differential between the room temperature and the set point during all modes of operations.

   h. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.

   i. Cold blow prevention in heating.

   j. Adjustable compensation for air stratification in heating.

G. Filters

1. Unit shall have factory-supplied resin net (cleanable) type filters. The return air filter material shall have the following characteristics:

   a. Odorless
   b. Temperature resistant to 185°F (85°C)
   c. Humidity resistant up to 95% RH

H. Electrical Requirements: Indoor units are 208/230-1-60 and are powered from the outdoor unit.

I. Special Features (Accessories)

1. User Interface can be accomplished with:

a. Wireless remote control.

b. Wired remote control (programmable or non programmable) shall be capable of controlling from 1 to 8 daisy-chained units.

2. Ceiling panel (grille)

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0260

DUCTLESS SPLIT SYSTEMS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. Outdoor-mounted, air-cooled split system outdoor section suitable for rooftop installation. Unit shall consist of a hermetic reciprocating, scroll, or rotary compressor, an air-cooled coil, propeller-type blow-thru out-door fans, reversing valve, accumulator, holding refrigerant charge heating mode metering device, and control box. Unit shall discharge air horizontally as shown on the contract drawings. Units shall function as the outdoor component of an air-to-air cooling and heating system.

B. Indoor, in-the-ceiling-mounted or wall mounted direct-expansion fan coil to be matched with the commercial heat pump unit.

1.2 QUALITY ASSURANCE

A. Unit construction shall comply with ANSI/ASHRAE 15, latest revision, and with the NEC.

B. Unit shall be rated (when matched with appropriate outdoor unit) per ARI Standard 210/240. Units shall be certified by UL and CSA.

C. Units shall be constructed in accordance with UL standards.

D. Units shall be listed in the CEC directory.

E. Unit cabinet shall be capable of withstanding Federal Test Standard No. 141 (method 6061) 500-hour salt spray test.

F. Air-cooled condenser coils shall be leak tested at 350 psig air pressure with the coil submerged in water.

1.3 DELIVERY, STORAGE AND HANDLING

A. Units shall be shipped in one piece and shall be stored and handled per unit manufacturer’s recommendations.

PART 2 - PRODUCTS

2.1 OUTDOOR HEAT PUMP CONDENSING UNIT

A. Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, charge of R-410A refrigerant and special features required prior to field start-up.

B. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized-steel, bonderized and coated with a baked-enamel finish.
2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.
3. Outdoor compartment shall be isolated and have an acoustic lining to assure quiet operation.

C. Fans

1. Outdoor fans shall be direct-drive propeller type, and shall discharge air horizontally. Fans shall blow air through the outdoor coil.

2. Outdoor fan motors shall be totally enclosed, single-phase motors with class B insulation and permanently lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.

3. Shaft shall have inherent corrosion resistance.

4. Fan blades shall be corrosion resistant and shall be statically and dynamically balanced.

5. Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil.

D. Compressor

1. Compressor shall be fully hermetic reciprocating or scroll type.

2. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from over temperature and over current. Scroll compressors shall also have high discharge gas temperature protection if required.

3. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.

4. Reciprocating compressors shall be equipped with crankcase heaters to minimize liquid refrigerant accumulation in compressor during shutdown and to prevent refrigerant dilution of oil.

5. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation.

6. Compressors shall be single phase or 3-phase as specified on the Contract Drawings.

E. Outdoor Coil: Coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes that are cleaned, dehydrated, and sealed.

F. Refrigeration Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, accumulator, bi-flow filter drier, pressure relief, reversing valve, and heating mode metering device.

G. Controls and Safeties - Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

1. Controls
   a. Time delay restart to prevent compressor reverse rotation on single-phase scroll compressors.
   b. Automatic restart on power failure.
   c. Safety lockout if any outdoor unit safety is open.
   d. A time delay control sequence is also provided standard through the fan coil board, thermostat, or controller.
   e. High-pressure and liquid line low-pressure switches.
   f. Automatic outdoor-fan motor protection.
   g. Start capacitor and relay (single-phase units without scroll compressors).

2. Safeties
   a. System diagnostics.
   b. Compressor motor current and temperature overload protection.
   c. High pressure relief.
   d. Outdoor fan failure protection.

H. Electrical Requirements

1. Unit shall operate on a 208-v or 230-v, 60 Hz power supply as specified on the equipment schedule.

2. Unit shall operate on three-phase, 60 Hz power at 208/230 v or 460 v, as specified.

3. Unit electrical power shall be a single point connection.

4. Unit control voltage to the indoor-fan coil shall be 24 v.

5. All power and control wiring must be installed per NEC and all building codes.

6. Unit shall have high- and low-voltage terminal block connections.

I. Special Features (Field Installed)

1. Low-Ambient Kit: Control shall regulate fan-motor cycles in response to saturated condensing pressure of the unit. The control shall be capable of maintaining a condensing temperature of 100 F ±10 F with outdoor temperatures to –20 F. Installation of kit shall not require changing the outdoor-fan motor.

2. Liquid Solenoid Valve: This electronically operated shutoff valve shall close and open in response to compressor operation. The valve should be used with all long-lines applications (over 100 ft).

3. Crankcase Heater (units with scroll compressors only): Unit shall be shipped with a clamp-on compressor oil sump heater.

2.2 4 WAY CEILING CASSETTE INDOOR UNIT

A. Indoor, direct-expansion, low-profile (11-3/4 in. high) in-ceiling fan coil. Unit shall come complete with cooling/heating coil, electric heater, fan, fan motor, piping connectors, electrical controls, condensate pump, and hanging brackets.

B. Unit cabinet shall be constructed of zinc-coated steel. Fully insulated discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall have filter tracks and cleanable filters which shall be accessible from below with a 1/4 -turn fastener. Adjacent room cooling to be provided by a simple knock-out in the cabinet side panel, and cabinet shall have provisions to accommodate a limited amount of ductwork, if desired.

C. Fan shall be a centrifugal, direct-drive blower type with air intake in center of the unit and discharge on the perimeter. Air louvers shall be adjustable for 2, 3, or 4-way discharge.

D. Coil:
Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins will be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a factory-installed condensate pump and drain connection for hose attachment to remove condensate.

E. Motors:
Motor shall be totally enclosed and permanently lubricated with inherent protection. Fan motor shall be 3-speed.

F. Controls:
Controls shall be 24V and shall be easily operated by the user from a wall-mounted control unit. Float control shall be in the condensate sump to shut unit down in case of pump malfunction. A wall-mounted electromechanical thermostat with 3 fan-speed selections and an auto/manual switch shall be supplied for field installation. Automatic changeover from cooling to heating modes and selectable 2 or 4 minute start-up delay shall be included. The R-22 refrigerant shall be controlled with a piston-type refrigerant metering device, and evaporator coil freeze protection shall be provided.

G. Filters:
Unit shall have filter track with factory-supplied cleanable filters.

H. Electrical Requirements:
Unit shall operate on a 208-v or 230-v, 60 Hz power supply as specified on the equipment schedule.

I. Operating Characteristics: (See Drawing Schedule)

J. Special Features (Field Installed)

1. Power Ventilation Kit: Kit shall allow ventilation of the conditioned space with outdoor air. The kit shall include filter, booster fan, and controls.

2. Electronic Programmable Thermostat: Thermostat shall be commercial grade and shall provide 7-day, 4-event scheduling. Integral sub base shall be included. Thermostat shall also provide 3-speed fan switchover capability, air sweep auto changeover, and shall not require a battery to retain memory.

3. Fresh Air Intake Kit: Kit shall include filter and duct connections to provide for outdoor ventilation air.

2.3 AIR CONDITIONING CONDENSATE PUMP

(PROVIDE IN ALL CASES WHERE CONDENSATE CANNOT DRAIN BY GRAVITY)

A. Pump shall be equal to “Little Giant” model no. VCMA-15ULS–554401. Automatic, 15 ft. shut-off, 1/2 gallon tank, safety switch check valve, 6 ft. power cord power cord with plug.

B. Provide 3/8” copper tubing discharge piping installed per manufacturer’s recommendations.

C. For roof discharge applications provide pitch pocket, rigid 3/8” copper discharge piping and gooseneck turned down 12 inches above roof. Provide splash block and remove pump check valve before installation.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0265

VRF HEAT RECOVERY OUTDOOR UNITS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. The Heat Recovery Variable Refrigerant Flow system is a three pipe system consisting of a single or multiple outdoor units, multiple indoor units of various types and capacities, and multiple Flow Selector boxes, individual or central indoor unit controls with on/off temperature settings, all connected by fully insulated refrigerant lines utilizing factory supplied, fully insulated, branching kits. Indoor units are connected to condensate piping that shall be terminated to the nearest drain point.

B. The system shall be fully capable of simultaneous heating and cooling operation as requested by the individual indoor zones that can consist of single or multiple indoor units.

C. The maximum number of connected indoor units shall not exceed 40.

D. The total connected indoor unit capacity shall range between 80 and 125% of the outdoor unit capacity.

1.2 AGENCY LISTINGS

A. Units shall be listed by ETL and be evaluated in accordance with UL standard 1995, 4th edition.

B. Units shall be listed in the AHRI directory.

C. All units shall meet the minimum Federal minimum efficiency standards and be tested per AHRI 1230 Standard.

1.3 DELIVERY, STORAGE AND HANDLING

A. Units shall be shipped in one piece and shall be stored and handled per unit manufacturer's recommendations.

B. Units shall be supplied with a base rail that provides openings for moving the unit by truck or rigging the unit by crane.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General

Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and the multiple inverter driven twin rotary compressors.

1. The maximum sound pressure rating for single module shall not exceed 63.5 dBa sound pressure in cooling and 65.5 dBa in heating. For twinned systems the sound pressure number should not exceed 66.5 dBa and 68.5 dBa.

2. The outdoor unit shall include an oversized accumulator and a liquid tank for proper heating performance while allowing the indoor unit PMV valve (metering device) to shut off completely when a zone is satisfied.

3. The outdoor unit shall be protected by a High-pressure switch, High-pressure sensor, Low-pressure sensor, Fusible plug, PC board fuse, and an inverter overload protector.

4. The outdoor unit shall be capable of operating in cooling mode down to 14°F ambient air temperature and down to -14°F ambient air temperature in heating. For simultaneous heating and cooling the unit shall be capable of operating between 14°F and 60°F ambient air temperature.

5. The outdoor unit shall include a total oil management system that balances oil between compressors within a module, replenishes compressor oil to the compressors in a module from the oil separator if required, and allows to move oil and refrigerant between twinned units if required even if one of the units is not running.

B. Unit Cabinet

1. Unit cabinet shall be constructed of pre-coated steel, finished on both inside and outside.

2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressors, fan and control components.

3. Compressors shall be isolated in a compartment and have an acoustic wrap to assure quiet operation.

4. The outdoor unit control panel shall include a sliding window to access adjustable controls and an LED display for setup and diagnostics.

5. Unit cabinet shall be capable of withstanding 500-hour salt spray test per Federal Test Standard No. 141 (Method 6061).

C. Fans

1. Outdoor fan shall discharge air vertically and be driven by a DC inverter variable speed motor with 64 steps that is capable of running down to 60 RPM.

2. Outdoor fan motor shall be totally enclosed with permanently lubricated bearings.

3. Motor shall be protected by internal thermal overload protection.

4. Fan blade shall be non metallic and shall be statically and dynamically balanced.

5. Outdoor fan shall be protected by a raised non metallic protective grille.

D. Compressors

1. Each outdoor unit module shall be equipped with two or three inverter driven twin rotary compressors with full range control to a level of 0.1 Hz.

2. Compressor shall be totally enclosed in the machine compartment.

3. Compressors shall be equipped with factory mounted crankcase heaters.

4. Internal overloads shall protect the compressor from over-temperature operation.

5. Motor shall be suitable for operation in a R-410A refrigerant atmosphere.

6. Compressor assembly shall be installed on rubber vibration isolators.

7. To maximize compressor reliability, multiple compressors, within a module, shall be started and operated in variable patterns to ensure equal run time on all compressors.

8. To ensure maximum efficiency throughout the system operations range, no compressor is required to run at maximum speed under any condition.

E. Outdoor Coil

1. Coil shall be constructed of aluminum fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated and sealed.

2. The coil configuration shall be 4 sided and fully separated from the machine compartment for more effective heat transfer and sound isolation.

3. The coil fans shall have a factory applied corrosion resistant blue-fin finish.

F. Controls and Safeties

1. All unit controls shall be capable of being interfaced with the existing Johnson Control System. The unit shall be able to be controlled by BACnet or LonWorks either directly or through an external gateway. Refer to Automatic Temperature Control Section for Sequence of Operation and Control Points.

2. Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

3. Controls

a. Compressor speed to match the refrigerant flow and capacity with the system requirements.

b. Outdoor fan motor speed for higher efficiency and lower sound.

c. Oil control from improved system reliability and comfort.

d. Pulse modulating valve control for precise control of the refrigerant distribution and accurate capacity management to avoid starting any units.

e. Control of compressor staging to maximize reliability and minimum run time on all compressors.

f. Module control of compressor operation, compressor speed, and outdoor heat exchange surface to maximize efficiency and sound level and reliability across the entire operating range of the system.

g. Control of the outdoor heat exchanger surface (main vs. sub heat exchangers) for maximum efficiency and comfort.

4. Safeties - The following safety devices shall be part of the condensing unit:

   a. High pressure switch
   b. Fuses
   c. Crankcase heater
   d. Fusible plug
   e. Over current relay for the compressor
   f. Thermal protectors for compressor and fan motor
   g. Compressor time delay
   h. Oil Recovery system
   i. Oil level sensor
   j. Over-current sensor
   k. Compressor suction and discharge temperature sensor
   l. Compressor suction and discharge pressure sensor

G. Electrical Requirements

1. All sizes shall utilize 460-3-60 field power supply.

2. Twinned systems shall have separate field power supply to each module.

3. Two core shielded low voltage cable shall be required for communication between outdoor and indoor unit.

4. All power and control wiring must be installed per NEC and all Building codes.

H. Refrigerant Piping and Line Lengths

1. Piping connections shall be from the front or the bottom of the unit.

2. The unit shall be capable of operating with maximum connected refrigerant line lengths of 985 ft.

3. The outdoor unit should have the ability to operate with a maximum height of 165 ft. between the outdoor and lowest indoor unit.

4. The maximum distance between the outdoor unit and the furthest fan coil shall not exceed 575 ft. No line size changes or oil traps shall be required.

5. The system should be capable of operating when the height difference between the upper and lower fan coil is 130 ft.

I. Auxiliary Refrigerant Components

1. All field supplied copper tubing connecting the outdoor unit to the indoor unit shall use factory supplied branching kits consisting of either Y joints or headers to ensure even refrigerant flow.

2. To ensure piping flexibility the system shall allow having Y joints or headers downstream of another header.

3. When twinning two modules, and in order to maximize efficiency and comfort, a 3/8” oil balance line shall be used to allow the flow oil and refrigerant between the two units even when one of the units is not running.

4. A flow selector box will be required to regulate the flow of high pressure hot gas or high pressure liquid to the fan coil requiring heating or cooling.

5. Up to 8 fan coils, all requiring same duty cycle, maybe connected to a single flow selector box.

6. A fan coil that runs in cooling only will not be required to connect to a flow selector box.

7. The flow selector box can be installed up to 49 feet away from the indoor unit.

8. The flow selector box shall be wired from the indoor unit using a factory supplied power and control wire harness.

9. The flow selector box shall not require a drain connection.

10. The flow selector box shall include a galvanized steel enclosure, full interior insulation and shall be tested prior to shipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0280

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.2 DESCRIPTION

A. This specification is to cover a complete Variable Frequency motor Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with a standard NEMA Design B induction motor.

B. The drive manufacturer shall supply the drive and all necessary options as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years. VFD's that are manufactured by a third party and "brand labeled" shall not be acceptable. All VFDs installed on this project shall be from the same manufacturer.

1.3 QUALITY ASSURANCE

A. Referenced Standards

1. Institute of Electrical and Electronic Engineers (IEEE)
   a. Standard 519-1992, IEEE Guide for Harmonic Content and Control.

2. Underwriters laboratories
   a. UL508C

3. National Electrical Manufacturer's Association (NEMA)
   a. ICS 7.0, AC Adjustable Speed Drives

4. IEC 16800 Parts 1 and 2

5. National Electric Code (NEC)
   a. NEC 430.120, Adjustable-Speed Drive Systems

6. International Building Code (IBC)
   a. IBC 2006 Seismic – referencing ASC 7-05 and ICC AC-156

B. Qualifications

1. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. VFDs with red label UL stickers, requiring additional branch circuit protection are not acceptable. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.

2. CE Mark – The VFD shall conform to the European Union ElectroMagnetic Compatibility directive, a requirement for CE marking. The VFD shall meet product standard EN 61800-3 for the First Environment restricted level.

3. The entire VFD enclosure, including the bypass shall be seismically certified and labeled as such in accordance with the 2006 International Building Code (IBC):

   a. VFD manufacturer shall provide Seismic Certification and Installation requirements at time of submittal.

   b. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake test data as defined by ICC AC-156.

   c. Seismic ratings based upon calculations alone are not acceptable. Certification of Seismic rating must be based on testing done in all three axis of motion.

4. Acceptable Manufactures

   a. ABB ACH Series.

   b. Alternate manufacturer's requests must be submitted in writing to the Engineer for approval at least 20 working days prior to bid. Approval does not relieve the supplier of specification requirements.

5. The VFD manufacturer shall have available a comprehensive, HVAC Drive Computer Based Training (CBT) product. The CBT product shall include detailed, interactive sections covering VFD unpacking, proper mechanical and electrical installation, and programming. The CBT product shall allow the user to provide just-in-time training to new personnel or refresher training for maintenance and repair personnel on the user's site. The CBT product shall be repeatable, precise and shall include record keeping capability. The CBT product shall record answers to simulations and tests by student ID number. The CBT product must be professionally produced and have interactive sections, student tests, and include video clips of proper wiring and installation.

1.4 SUBMITTALS

A. Submittals shall include the following information:

1. Outline dimensions, conduit entry locations and weight.

2. Customer connection and power wiring diagrams.

3. Complete technical product description include a complete list of options provided. **Any portions of this specification not meet must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.**

4. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).

   a. The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors, **no exceptions**.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES

A. The VFD package as specified herein shall be enclosed in a UL Listed Type enclosure, exceeding NEMA enclosure design criteria (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.

1. Environmental operating conditions: VFDs shall be capable of continuous operation at 0 to 50^0 C (32 to 122^0 F) ambient temperature as per VFD manufacturers documented/submittal data or VFD must be oversized to meet these temperature requirements. Not acceptable are VFD's that can only operate at 40° C intermittently (average during a 24 hour period) and therefore must be oversized. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.

2. Enclosure shall be rated UL Type 1 and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable. NEMA only type 1 enclosures are not acceptable (must be UL Type 1).

3. Provide NEMA 3R enclosures where exposed to outside weather or wet conditions.

B. All VFDs shall have the following standard features:

1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.

2. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.

3. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. Capacitor back-up is not acceptable. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output Form-C relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.

4. The VFD's shall utilize pre-programmed application macro's specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.

5. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, the VFD shall cycle the cooling fans on and off as required.

6. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).

7. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

8. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.

9. The VFD shall have internal 5% impedance reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add an AC line reactor.

10. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120. Input and output current ratings must be shown on the VFD nameplate.

11. The VFD shall include a coordinated AC transient surge protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.

12. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.

13. The VFD shall have user programmable underload and overload curve functions to allow user defined indications of broken belt or mechanical failure / jam condition causing motor overload

14. The VFD shall include multiple "two zone" PID algorithms that allow the VFD to maintain PID control from two separate feedback signals (4-20mA, 0-10V, and / or serial communications). The two zone control PID algorithm will control motor speed based on a minimum, maximum, or average of the two feedback signals. All of the VFD PID controllers shall include the ability for "two zone" control.

15. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.

16. The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.

17. Provide drive with circuit breaker option and remote panel mounting kit.

C. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed. The lockout range must be fully adjustable, from 0 to full speed.

2. Two (2) PID Set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed-loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two independent parameter sets for the PID controller and the capability to switch between the parameter sets via a digital input, serial communications or from the keypad. The independent parameter sets are typically used for night setback, switching between summer and winter set points, etc.

3. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (ie. valves, dampers, etc.). All set points, process variables, etc. to be accessible from the serial communication network.

4. Two (2) programmable analog inputs shall accept current or voltage signals.

5. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback, and other data..

6. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC or 24VAC.

7. Three (3) programmable, digital Form-C relay outputs. The relay outputs shall include programmable on and off delay times and adjustable hysteresis. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating of 2 amps RMS. Outputs shall be true Form-C type contacts; open collector outputs are not acceptable.

8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display “start enable 1 (or 2) missing”. The safety input status shall also be transmitted over the serial communications bus.

9. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates. The time delay shall be field programmable from 0 – 120 seconds. Start delay shall be active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.

10. Seven (7) programmable preset speeds.

11. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.

12. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise. The VFD shall have selectable software for optimization of motor noise, energy consumption, and motor speed control.

13. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows higher carrier frequency settings without derating the VFD.

14. The VFD shall include password protection against parameter changes.

D. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words. The keypad shall include a minimum of 14 assistants including:

1. Start-up assistant

2. Parameter assistants
   a. PID assistant
   b. Reference assistant
   c. I/O assistant
   d. Serial communications assistant
   e. Option module assistant
   f. Panel display assistant
   g. Low noise set-up assistant

3. Maintenance assistant
4. Troubleshooting assistant
5. Drive optimizer assistants

E. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):

1. Output Frequency
2. Motor Speed (RPM, %, or Engineering units)
3. Motor Current
4. Motor Torque
5. Motor Power (kW)
6. DC Bus Voltage
7. Output Voltage

F. The VFD shall include a fireman's override input. Upon receipt of a contact closure from the fire / smoke control station, the VFD shall operate in one of two modes: 1) Operate at a programmed predetermined fixed speed ranging from -500Hz (reverse) to 500Hz (forward). 2) Operate in a specific fireman's override PID algorithm that automatically adjusts motor speed based on override set point and feedback. The mode shall override all other inputs (analog/digital, serial communication, and all keypad commands), except customer defined safety run interlocks, and force the motor to run in one of the two modes above. "Override Mode" shall be displayed on the keypad. Upon removal of the override signal, the VFD shall resume normal operation, without the need to cycle the normal digital input run command.

G. Serial Communications

1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, and BACnet. Optional protocols for LonWorks, Profibus, EtherNet, BACnet IP, and DeviceNet shall be available. Protocol provided shall match ATC system in Building. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority (i.e. BTL Listing for BACnet). Use of non-certified protocols is not allowed.

2. The BACnet connection shall be an EIA-485, MS/TP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:

   a. Data Sharing – Read Property – B.
   b. Data Sharing – Write Property – B.
   c. Device Management – Dynamic Device Binding (Who-Is; I-Am).
   d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
   e. Device Management – Communication Control – B.

3. If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.

4. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.

5. Serial communication in bypass shall include, but not be limited to; bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the DDC to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible.

6. The VFD / bypass shall allow the DDC to control the drive and bypass digital and analog outputs via the serial interface. This control shall be independent of any VFD function. The analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive and bypass' digital (Form-C relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive and bypass' digital inputs shall be capable of being monitored by the DDC system. This allows for remote monitoring of which (of up to 4) safeties are open.

7. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value / hot water valve control, etc. Both the VFD PID control loop and the independent PID control loop shall continue functioning even if the serial communications connection is lost. As default, the VFD shall keep the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.

H. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level with up to 100 feet of motor cable. No Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, First Environment.

I. All VFD's through 75HP at 480 V shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad. The VFD shall not sustain damage from this power mis-wiring condition.

J. OPTIONAL FEATURES – Optional features shall be furnished and mounted by the drive manufacturer. All optional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.

1. Door interlocked, pad-lockable disconnect switch that will disconnect all input power from the drive and all internally mounted options. Disconnect option shall be available with or without systems requiring bypass.

2. Field-bus adapters - Protocols such as BACnet IP shall be a plug in modules.

K. Bypass

1. A complete factory wired and tested bypass system consisting of a door interlocked, pad-lockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses. UL Listed motor overload protection shall be provided in both drive and bypass modes.

2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the "Off" position before either enclosure may be accessed.

3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 Amps and this rating shall be indicated on the UL data label.

4. The drive and bypass package shall be seismic certified and labeled to the IBC:
   a. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake table test data as defined by ICC AC-156.

5. Drive Isolation Fuses - To ensure maximum possible bypass operation, fast acting fuses, exclusive to the VFD, shall be provided to allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection. This maintains bypass operation capability in the event of a VFD failure. Bypass designs which have no such fuses, or that incorporate fuses common to both the VFD and the bypass, will not be accepted. Third contactor "isolation contactors" are not an acceptable alternative to fuses, as contactors could weld closed and are not an NEC recognized disconnecting device.

6. The bypass shall maintain positive contactor control through the voltage tolerance window of nominal voltage +30%, -35%. This feature is designed to avoid contactor coil failure during brown out / low line conditions and allow for input single phase operation when in the VFD mode. Designs that will not allow input single phase operation in the VFD mode are not acceptable.

7. Motor protection from single phase power conditions - the bypass system must be able to detect a single phase input power condition while running in bypass, disengage the motor in a controlled fashion, and give a single phase input power indication. Bypass systems not incorporating single phase protection in bypass mode are not acceptable.

8. The bypass system shall be designed for stand-alone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed. Bypass systems that do not maintain full functionality with the drive removed are not acceptable.

9. Serial communications – the bypass shall be capable of being monitored and / or controlled via serial communications. On-board communications protocols shall include ModBus RTU; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet MS/TP.

    a. Serial communication capabilities shall include, but not be limited to: bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the BAS to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The BAS shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus and / or via a Form-C relay output – keypad "Hand" or "Auto" selected, bypass selected, and broken belt indication. The BAS system shall also be able to monitor if the motor is running in the VFD mode or bypass mode over serial communications. A minimum of 50 field serial communications points shall be capable of being monitored in the bypass mode.

    b. The bypass serial communications shall allow control of the drive/bypass (system) digital outputs via the serial interface. This control shall be independent of any bypass function or operating state. The system digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. All system analog and digital I/O shall be capable of being monitored by the BAS system.

10. There shall be an adjustable motor current sensing circuit for the bypass and VFD modes to provide proof of flow (broken belt) indication. The condition shall be indicated on the keypad display, transmitted over the BAS and / or via a Form-C relay output contact closure. The broken belt indication shall be programmable to be a system (drive and bypass) indication. The broken belt condition sensing algorithm shall be programmable to cause a warning or system shutdown.

11. The digital inputs for the system shall accept 24VAC or 24VDC. The bypass shall incorporate an internally sourced power supply and not require an external control power source. The bypass power board shall supply 250 mA of 24 VDC for use by others to power external devices.

12. There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad command, time-clock control, digital input, or serial communications) the bypass shall provide a dry contact closure that will signal the damper to open before the motor can run. When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a bypass system input and allows motor operation. Up to four separate safety interlock inputs shall be provided. When any safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. This feature will also operate in Fireman's override / smoke control mode.

13. The bypass control shall monitor the status of the VFD and bypass contactors and indicate when there is a welded contactor contact or open contactor coil. This failed contactor condition shall be indicated on the bypass LCD display, programmed to activate a Form-C relay output, and / or over the serial communications protocol.

14. The bypass control shall include a programmable time delay bypass start including keypad indication of the time delay. A Form C relay output commands the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates at full speed in the bypass mode. The time delay shall be field programmable from 0 – 120 seconds.

15. There shall be a keypad adjustment to select manual or automatic transfer to bypass. The user shall be able to select via keypad programming which drive faults will result in an automatic transfer to bypass mode and which faults require a manual transfer to bypass. The user may select whether the system shall automatically transfer from drive to bypass mode on the following drive fault conditions:

    a. Over current
    b. Over voltage
    c. Under voltage
    d. Loss of analog input

16. The following operators shall be provided:

    a. Bypass Hand-Off-Auto
    b. Drive mode selector
    c. Bypass mode selector
    d. Bypass fault reset

17. The bypass shall include a two line, 20 character LCD displays. The display shall allow the user to access and view:

    a. Energy savings – in US dollars
    b. Bypass motor amps
    c. Bypass input voltage– average and individual phase voltage
    d. Bypass power (kW)
    e. Bypass faults and fault logs
    f. Bypass warnings
    g. Bypass operating time (resettable)
    h. Bypass energy (kilowatt hours – resettable)
    i. I/O status
    j. Parameter settings / programming
    k. Printed circuit board temperature

18. The following indicating lights (LED type) or keypad display indications shall be provided. A test mode or push to test feature shall be provided.

    a. Power-on (Ready)
    b. Run enable
    c. Drive mode selected
    d. Bypass mode selected
    e. Drive running
    f. Bypass running
    g. Drive fault
    h. Bypass fault
    i. Bypass H-O-A mode
    j. Automatic transfer to bypass selected
    k. Safety open
    l. Damper opening
    m. Damper end-switch made

19. The Bypass controller shall have six programmable digital inputs, and five programmable Form-C relay outputs. This I/O allows for a total System (VFD and Bypass) I/O count of 24 points as standard. The bypass I/O shall be available to the BAS system even with the VFD removed.

20. The on-board Form-C relay outputs in the bypass shall programmable for any of the following indications.

    a. System started
    b. System running
    c. Bypass override enabled
    d. Drive fault
    e. Bypass fault
    f. Bypass H-O-A position
    g. Motor proof-of-flow (broken belt)
    h. Overload
    i. Bypass selected
    j. Bypass run
    k. System started (damper opening)
    l. Bypass alarm
    m. Over temperature

21. The bypass shall provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in VFD or Bypass mode. The remote start/stop contact shall operate in VFD and bypass modes. The terminal strip shall allow for independent connection of up to four (4) unique safety inputs.

22. The bypass shall include a supervisory control mode. In this bypass mode, the bypass shall monitor the value of the VFD's analog input (feedback). This feedback value is used to control the bypass contactor on and off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps even with the VFD out of service.

23. The user shall be able to select the text to be displayed on the keypad when an external safety opens. Example text display indications include "FireStat", "FreezStat", "Over pressure" and "Low suction". The user shall also be able to determine which of the four (4) safety contacts is open over the serial communications connection.

24. Smoke Control Override Mode (Override 1) – The bypass shall include a dedicated digital input that will transfer the motor from VFD mode to Bypass mode upon receipt of a dry contact closure from the Fire / Smoke Control System. The Smoke Control Override Mode action is not programmable and will always function as described in the bypass User's Manual documentation. In this mode, the system will ignore low priority safeties and acknowledge high priority safeties. All keypad control, serial communications control, and normal customer start / stop control inputs will be disregarded. This Smoke Control Mode shall be designed to meet the intent of UL864/UUKL.

25. Fireman's Override Mode (Override 2) – the bypass shall include a second, programmable override input which will allow the user to configure the unit to acknowledge some digital inputs, all digital inputs, ignore digital inputs or any combination of the above. This programmability allows the user to program the bypass unit to react in whatever manner the local Authority Having Jurisdiction (AHJ) requires. The Override 2 action may be programmed for "Run-to-Destruction". The user may also force the unit into Override 2 via the serial communications link.

26. Class 10, 20, or 30 (programmable) electronic motor overload protections shall be included.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.

B. Power wiring shall be completed by the electrical contractor, to NEC code 430.122 wiring requirements based on the VFD input current. Caution: VFDs supplied without internal reactors have substantially higher input current ratings, which may require larger input power wiring and branch circuit protection. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.2 START-UP

A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.

3.3 PRODUCT SUPPORT

A. Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available at both the specifying and installation locations. A toll free 24/365 technical support line shall be available.

B. A computer based training CD or 8-hour professionally generated video (VCR format) shall be provided to the owner at the time of project closeout. The training shall include installation, programming and operation of the VFD, bypass and serial communication.

3.4 WARRANTY

A. The VFD Product Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available.

END OF SECTION

SECTION 23 0290

DUCT MOUNTED COILS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DUCT MOUNTED COILS

A. Coils as manufactured by Carrier shall be with aluminum plate fins, have collars drawn, belled, and firmly bonded to copper tubes by mechanical expansion of tubes. No soldering or tinning used in the bonding process.

B. Coils have galvanized steel casing and are mounted pitched in the unit casing. Coils are to be removable in duct flanges.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0300

FANS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 FANS

A. Furnish and install fans of the type, models, size and capacity indicated on the Drawings. Models indicated are as manufactured by Carnes Company. ACME or Greenheck, with equivalent characteristics will be considered.

B. Refer to Drawing schedule for required accessories and related appurtenances.

2.2 ROOF EXHAUST FANS

A. All roof exhaust fans shall be centrifugal roof exhausters of aluminum rustproof construction.

B. Units shall be direct connected with full ball-bearing motor. Power unit shall be isolated against vibration by means of oil resistant rubber or spring steel mounting.

C. Provide square insulated curb cap of aluminum with aluminum liner as an integral part of the unit. Each unit shall be equipped with a back draft or automatic damper, disconnect switch for the motor and birdscreens.

2.3 IN-LINE FANS

A. Construction: Unit exterior shall be constructed of heavy gauge galvanized steel. The fan housing shall be square in shape and readily attachable to building ductwork. Unit side panels shall be removable for easy access for maintenance and service. The power assembly shall be removable as a complete module.

B. Wheel: Wheels shall be of the centrifugal backward inclined type. Wheels shall be constructed of aluminum and contain a matching inlet venturi for optimum performance. Wheels shall be statically and dynamically balanced.

C. Shaft: Fan shafts shall be precision ground and polished. Shafts shall have a first critical speed of at least 125% of the fan's maximum operating speed.

D. Bearings: Bearings shall be of the one piece, cast iron, pillow block type with relubricable zerk fittings. Bearings shall be designed for final system balancing.

E. Drive: Drives shall be sized for a minimum of 150% of driven horsepower. Machined, cast iron motor sheaves shall be adjustable for final system balancing.

F. Motor: Motor shall be heavy duty ball bearing type, closely matched to the fan load. All motors shall be listed by UL and/or CSA. A disconnect switch shall be factory installed and wired to the fan motors as standard. Motors shall be mounted on the outside of the unit isolated from the airstream. The belt and pillow block ball bearings shall be protected from the airstream by an enclosure.

G. Backdraft Damper: When no motorized damper is indicated on Drawings at discharge of fan, provide gravity backdraft damper.

H. Fans shall bear the AMCA ratings seal for Sound and Air performance. Fans shall carry the UL and/or CSA listing mark. Fans shall bear a permanently attached nameplate displaying model and serial number of the unit for future identification.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0310

HOT WATER CABINET HEATERS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 HOT WATER CABINET HEATERS

A. Furnish and install where indicated on the Drawings hot water cabinet heaters as manufactured by Sterling Co. of model, capacity and performance noted on the Drawing schedule.

B. The cabinet shall be 16 gauge steel, four side overlap front panels, with M-shaped stiffener running entire panel length as standard. Integral, stamped, inlet and outlet insulated over entire coil section.

C. Front panel removed with two tamperproof screws, and shall be of finish as selected by Architect. Unit to be equipped with factory mounted fan cycling thermostat. Fans are forwardly curved double-inlet centrifugal of aluminum construction and are modular in design.

D. The water coil is constructed of copper tubing mechanically expanded into aluminum fins. All joints are brazed with high temperature silver alloy. Water coils have a plugged drain tube and vent tube extended into the unit end compartment. Automatic air vent fittings shall be provided. Coils are field reversible.

E. Filters are removable by removing front panel. 1" woven glass filters standard to be used.

F. Provide factory finished trim flange for all semi-recessed applications.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0320

HOT WATER UNIT HEATERS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 HOT WATER UNIT HEATERS

A. Furnish and install where shown on the Drawings model as manufactured by Sterling Co. or approved equal and shall be of sizes noted on the Drawing.

B. Casing shall be 20 gauge die-formed steel. Casing substrates shall be prepared for finishing with a hot wash, iron phosphatizing clear rinse, chromic acid rinse and oven drying. Paint finish shall be of lead-free, chromate-free, alkyd melamine resin base and applied with an electrostatic two-pass system.

C. Coil elements and headers shall be of heavy wall drawn seamless copper tubing. Element tubes shall be brazed into extruded header junctions. Pipe connection saddles shall be of cast bronze. Aluminum fins shall have drawn collars to assure permanent bond with expanded element tubes and exact spacing.

D. Motors shall be totally enclosed, resilient mounted with class B windings. All motors shall be designed for horizontal mounting.

E. Fans shall be of the aluminum blade, steel hub type designed and balanced to assure maximum air delivery, low motor horsepower requirements and quiet operation. Blades are spark proof. Fan guards shall be welded steel, zinc plated or painted.

F. Units shall be equipped with horizontal, individually adjustable louvers. Vertical louvers for 4-way air control shall be available as an optional extra.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0325

CEILING RADIANT PANEL HEATERS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 RADIANT PANEL HEATERS

A. Furnish and install linear panel heaters as manufactured by Sterling Co., or other considered equal as indicated on the Drawings. Type and size as noted on Drawing. Unit shall be installed in a neat and workmanlike manner in accordance with the Specifications and manufacturer's recommendations.

B. The aluminum planks shall incorporate a tube saddle channel as an integral part of the profile which can be integrated into a suspended ceiling to provide overhead radiant heating. A non-hardening heat paste between the tubing and the aluminum face plate shall ensure even heat distribution to the active face, providing overall thermal efficiency. The panels' planks shall be tongue and groove to provide a clean joint longitudinally. They shall be held together using a special clipping system.

C. The system can be used with hot water at various temperatures; insulation blankets with a heat reflecting foil backing are utilized to maintain heating efficiency.

D. The panels are fabricated from 18 gauge aluminum sheet to which a heating coil is mechanically fastened. Thermal contact between the coil and panel is maintained by an aluminum heat saddle fastened with welded aluminum or steel studs. The coil is clipped to the heat saddle using cadmium plated steel clips where heat transfer paste is used at the interface between the aluminum heat saddle and both the face of the panel and the tubing.

E. Dimensions and Weight

1. Linear panels shall be available in a variety of lengths of up to 16 ft. and widths in multiples of 6".

2. The working weight for the aluminum panels is approximately 2.0 lb./ft^2.

F. Materials of Construction

1. Pipework: Panel shall have its own serpentine pipe coil of 5/8" O.D. tubing.

2. Panels: Extruded aluminum planks.

3. Paint Finish: Standard finish is white polyester powder coating.

4. Contact Strips: Aluminum heat saddle bolted to the back of the panel using steel or aluminum0 studs which are welded to the panel.

5. Insulation: Minimum of 1" thick foil back batt insulation by this contractor

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 26 0330

CONVECTORS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 CONVECTORS

G. Furnish and install Convectors as manufactured by Sterling Co., Airtherm Co. and American Air Filer Co. considered equal as indicated on the Drawings. Type and size as noted on Drawing. Unit shall be installed in a neat and workmanlike manner in accordance with the Specifications and manufacturer's recommendations.

H. Convector element shall be constructed of copper tubes expanded and rolled into cast iron headers with contact further strengthened by brass bushings, aluminum fins, ribbed steel side plates and fin tube supports.

I. Cabinet shall have a one piece 14 gauge steel front panel. Front panel shall be held in place by camlock fasteners.

J. Dampers shall be factory mounted on the element to reduce heating capacity up to 70% when closed. Key operated damper-tamperproof. Baked enamel finish shall be provided in standard manufacturer's colors as selected by the Architect. Unit shall have (camlock) access doors to provide access to valves.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0340

FIN TUBE RADIATION

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 FIN TUBE RADIATION

A. Furnish and install fin-tube heating elements and enclosures, indicated on Drawings, together with required mounting components and accessories.

B. Materials shall be as manufactured by Sterling Radiator Co., Vulcan Radiator Co. or Standard Fin-Pipe Radiator Corp.

C. Heating Elements

1. Various lengths and assemblies are indicated on the plan together with their pipe sizes, fin sizes and spacing. Elements shall be completely independent of and shall not touch enclosures to assure low surface temperature.

2. Heating elements shall consist of full-hard aluminum plate fins not less than .20" thick, permanently bonded to copper seamless drawn tube and guaranteed for working pressure at 300 degrees F not less than 200 psi for 1-1/4" tube. Fins shall be actually embedded in the copper tube.

D. Enclosure and Accessories

1. Enclosures and accessories shall be of style and dimensions indicated on our Drawings and shall be fabricated from zinc-coated steel. Enclosures shall be 16 gauge. On wall-to-wall applications, enclosures shall be furnished in one piece up to a maximum of 10’ - 10" enclosure length for rooms or spaces measuring a maximum of 10' - 10" wall length, using a 6" end trim each end. Enclosures shall be furnished in two or more lengths for wall lengths exceeding 10' - 10".

2. Left end of all enclosures shall have spot-welded back-up angles. The mating right end shall be fastened securely with screws. End enclosures shall have same method of joining.

3. End trims, furnished with roll-flanged edges, shall be used between ends of enclosures and walls on wall-to-wall applications. End trims to be 6" maximum length and shall be attached without visible fasteners. End enclosures shall be furnished where indicated, shall be same gauge as enclosures, and be factory-welded to enclosures.

4. Enclosures shall be supported at top and bottom by means of heavy gauge mounting channel and allow installation and removal of enclosures without scraping walls or disturbing paint lines. Enclosures are securely fastened to the bottom support.

5. Access doors shall be provided where noted on Drawings. Doors shall be 8" x 8" and shall be located directly in the enclosures. Doors shall be hinged. Where radiation is located behind casework coordinate access door locations with casework vendor.

6. Provide vertical and horizontal enclosure for pipe risers and runouts which are exposed above/below/adjacent to radiation enclosure. Riser enclosure shall be of same gauge and finish as radiation enclosure. Provide wall plate which enclosure shall snap onto without exposed fasteners. Sterling model PCH (V).

7. Enclosure finish shall be as selected by Architect (and shall match unit ventilator finish when unit ventilators are also specified for the project).

E. Enclosure Brackets and Element Hangers

1. Enclosure bracket and element hangers shall be installed not farther than 4' apart. Brackets shall be die-formed from 3/16" thick stock, 1-1/2" wide, and shall be lanced to support and position lower flange of enclosure. Enclosures shall be firmly attached to brackets by set screws, operated from under the enclosure. Devices, which do not provide positive fastening of enclosures, are not acceptable. Brackets shall be inserted in pre-punched slots in mounted channel to insure correct alignment and shall be fastened securely to wall at bottom.

2. Sliding saddles shall support heating elements and provide positive positioning of element in enclosure to insure maximum heating efficiency while preventing any possibility of fin impingement on brackets or enclosure joints during expansion or contraction. Element supports shall be a double saddle design fabrication from 16 gauge zinc-coated steel.

3. Saddle shall slide freely on saddle support arm bolted to support bracket. Support arm shall allow 1-1/2" height adjustment for pinch. The element support saddle shall allow 1-5/8" lateral movement for expansion and contraction of heating element. Rod or wire hangers not acceptable.

4. Submit shop drawings of all heating elements and enclosures. Enclosure measurements and accessories are not to be fabricated until after verified measurements have been taken at the site.

F. Piping Enclosures: Where concealed piping in ceilings and wall of finished spaces is not possible, provide vertical or horizontal metal piping enclosures equal to “Sterling” model PCH (horizontal) or PCHV (vertical). Provide all required hangers, supports, corners, brackets, etc. color per Architect.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0400

SHEETMETAL WORK AND RELATED ACCESSORIES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements shall govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 SHEETMETAL DUCTWORK

A. Contractor shall furnish and install all sheet-metal ducts as shown on the Drawings. While the Drawings shall be adhered to as closely as possible, the Engineer reserves the right to vary the run and size to meet the field conditions. Any duct size not shown shall be sized in proportion to the air carried at the same resistance in similar ductwork, or of size as directed.

B. All ductwork shall be constructed of galvanized steel gauges in accordance with the latest edition of the ASHRAE/SMACNA Guide. Bracing angles for ductwork shall be hot dipped galvanized for steel ductwork and appropriate gauge for aluminum ductwork. All ducts 18" and over in width shall be cross broken to prevent flutter. Duct pressure class shall be 2” w.g.

C. Ducts shall be braced as follows:

1. All ducts not exceeding 24" on one side shall be assembled with airtight slip joints.

2. 25" t o 40" larger dimension 1" x 1" x 1/8" angles.

3. 41" to 60" larger dimension 1-1/2" x 1-1/2" x 1/8" angles.

4. All bracing angles shall be a minimum of 4' apart along the length of the duct.

5. Furnish and install all angles and frames for all registers, diffusers, grilles and louvers.

6. Support horizontal ducts with hangers spaced not more than 8' apart. Place hangers at all changes in direction. Use strap hangers for cuts up to 30" wide.

D. Comply with all State and Local regulations regarding fire stopping and fireproofing. Provide fusible link fire dampers as required by State, local and Underwriter authorities and where indicated on the Drawings. Each fire damper shall be installed in such a manner as to permit ready access for inspection and maintenance purposes.

E. Provide splitter and butterfly dampers, deflecting vanes for control of air volume and direction and for balancing systems, where indicated, specified, directed and as required for the proper operation of the systems. Dampers shall be of the same material as the duct, at least one gauge heavier that the duct, reinforced where indicating quadrant and locking device for adjusting damper and locking in position.

F. Where ducts fewer than 100 square inches penetrate a rated wall, steel ductwork system of a minimum 0.0127 inch thickness shall be used.

G. All elbows shall have a minimum center line radius of 150% of duct width. If the radius is smaller, turning vanes shall be used: Turning vanes shall be double thickness, fitted into slide strips and screwed or riveted to duct below.

H. Contractor shall furnish and install all access doors in ducts as required. Access doors shall be of the pan type 1" thick and shall be provided with two galvanized hinges and suitable latched. Access doors insulated with same thickness material as duct and shall be double casing construction.

I. Rigid spiral ductwork within Gymnasium shall be double wall type.

2.2 REGISTERS AND DIFFUSERS

A. Registers and diffusers shall be installed where shown on the Drawings and shall be of the sizes specified and the type indicated on the drawing schedule.

B. All registers and diffusers shall be installed in accordance with manufacturer's recommendations.

C. Registers and diffusers shall be as manufactured by Anemostat Co., Carnes or Hart and Cooley.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0410

PIPING, FITTINGS, VALVES AND NOTES (HOT WATER)

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements shall govern work in this section. Submit shop drawings for checking and approval.

1.1 PIPING NOTES

A. The Contractor shall erect all pipe, fittings, valves, hangers, anchors, expansion joints and all accessories specified, indicated on the Drawings or required to assure proper operation of all piping systems installed under this Contract. All piping shall be maintained at a proper level to assure satisfactory operation, venting and drainage. Piping and valves in any locality where possible shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance.

B. All piping shall be new and of the material and weight specified under various services. Steel and wrought iron pipe 2" and larger shall be seamless or lap welded. All piping shall have the maker's name and brand rolled on each length of pipe.

C. All piping, fittings, valves and strainers shall be cleaned of grease, dirt and scale before installation. All temporary pipe openings shall be kept closed during the performance of the work. The ends of all piping shall be reamed smooth and all burrs removed before installation.

D. All piping shall be cut accurately to measurements taken on the job. Offset connections shall be installed alignment of vertical to horizontal piping and where required to make a true connection and to provide for expansion. Bent or sprung pipe shall not be installed where shown on Drawings and where necessary to provide for expansion of piping. Cold spring hot lines one-half estimated distance of maximum expansion. Suitable pipe anchors shall be installed where shown or required.

E. Piping connections shall have unions where necessary for replacement and repair of equipment. Gate valves and controls valves shall be installed where shown and where necessary for proper operation and service.

F. Vertical piping shall be plumb and horizontal piping shall be parallel to walls and partitions. Piping shall be supported as required to prevent the transmission of noise and vibration.

G. Work shall include all pipe, fittings, offsets and requirements for the installation of piping of other work including ducts and conduit. Reducing fittings shall be used where pipe changes size. All piping shall be installed with ample clearance to center accurately in sleeves through floors, and walls and partitions.

H. Piping shall be downgraded to drain connections at low points and upgraded to vent connections at high points unless otherwise noted. Drain connections shall be valved and piped to a floor drain. Vent connections on mains shall be equipped with air vent valves fitted with a copper tube drip line extended to a drain outlet. Vent connections on branches and equipment shall be fitted with key type manual vent cocks.

I. Drain piping shall be installed from all equipment as required. The Contractor shall extend drain piping and turn down over floor drains.

PART 2 - PRODUCTS

2.1 PIPING (ABOVEGROUND)

A. All piping installed under this Section of the Specifications shall be in accordance with the following schedule.

1. All piping, except where indicated differently, (i.e. underground piping) shall be standard weight black steel pipe Schedule 40, Grade A53, black steel. Pipe 2" and smaller, cast iron screwed fittings. Pipe 2-1/2" and larger, steel welding fittings. Pipe and fittings as manufactured by National, Wheeling, Bethlehem or equal, manufactured in accordance with ASTM current edition. All pipes must be reamed before installation.

2. Where the Contractor elects to use copper piping, it shall be rigid Type "L" copper, Chase, Anaconda or approved equal. Fittings shall be wrought copper, Nibco, Anaconda, Mueller or approved equal. Where copper piping is used, make all additional provisions for expansion. All condensate piping shall be Type "M" copper, rigid, full size of unit drain tapping, or larger as shown on Drawings.

3. All drainage pipe lines, 2" larger except where galvanized screw pipe is shown on the Drawings or specified hereafter, shall be extra heavy cast iron soil pipe and fittings.

B. Piping installation shall be arranged for draining through accessible valves at low points.

C. Threaded short and close nipples shall be Schedule 80, extra heavy weight of the same material as pipe in system in which they are installed.

D. All bare copper pipe, tubing and fittings shall be cleaned with steel wool and all excess solder shall be removed.

2.3 VALVES

A. All valves, unless specified or noted otherwise, shall be designed for a working pressure of not less than 200 psi water or 125 psi steam with name and pressure rating of valve cast in body. All valves shall be of the same manufacturer, unless specified otherwise. Valves for cut-off shall be gate valves, unless otherwise specified.

B. All valves of same manufacturer: similar to Jenkins Bros., Walworth, Kennedy or approved equal.

C. Four inch and larger, flanged; smaller sizes, screwed.

D. All Gate and Globe valves shall be installed with handle in an upright position.

E. The Contractor shall furnish and install all valves shown on Drawings and all valves that are necessary for proper operation and maintenance of systems and equipment. All piping connections to each piece of equipment and all branch connections to mains shall have cut-off valves.

F. The following schedule of valves for hot water, etc. is based on Jenkins Brothers, Inc. catalog numbers (except as noted); equivalent Lukenheimer, Walworth, O-I-C, Crane Fairbanks Company valves will be acceptable.

G. Ball Valves

1. 1/4" to 2-1/2” rated for 600 p.s.i wog, with brass body, chrome plated brass ball, virgin PTFE seats and full port with threaded or solder connections.

2. 2-1/2” and larger rated for 200 p.s.i with carbon steel body, stainless steel full port ball, RTFE seats, lever operated to 4” gear operated 6” and above, with flanged end connections.

H. Gate Valves

1. Up to 2" : Bronze gate solid wedge, inside screw traveling stem union bonnet, -Fig. 47U

2. 2-1/2" and 3" : Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 650-A

3. 4" and larger: Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 651-A

I. Globe Valves

1. Up to 2" : Bronze body, regrinding seat ring and plug, union bonnet, -Fig. 546P

2. 2-1/2" and 3" : Iron body, bronze-mounted globe and angle, regrinding disc and seat ring, OS&Y -Fig. 613

3. All gate valves 6" and larger: Fitted 3/4" by-pass globe valve.

J. Plug Valves

1. Up to 2" : Lubricated, semi-steel short pattern wrench operated, -Fig. 142

2. 2-1/2" and larger: Lubricated, semi-steel short pattern wrench operated, -Fig. 143

3. Similar to Rockwell Mgd. Co., Jenkins, Kennedy or approved equal.

K. Butterfly Valves used for hot water shall be the following:

1. 2-1/2" to 12” rated for 175 p.s.i bubble tight close off, 14” and larger for 150 p.s.i close-off.

2. Full lug cast iron body, aluminum bronze disc, stainless steel stem EPDM peroxide cured seat.

3. 2-14” to 6” valves to be equipped with 10 position notch plate and lever lock handle.

4. On installation, valves to be in full open position when flange bolts are tightened and stem in a horizontal position except when equipped with a chain-wheel gear operator.

5. Provide chain wheel gear operator on all valves installed 7 feet or higher.

6. Valves to be designed with replaceable seat and parts kits.

7. Valve to be Bray series 31, Dezurik 637 or Demco.

L. Check Valves

1. 150 psi WSP class.
2. Up to 2" : Bronze, regrinding bronze disc, screw-in cap, -Fig. 762A
3. 2-1/2" and 3" : Iron body, bronze mounted regrinding bronze seat ring and disc, -Fig. 623
4. 4" and larger: Iron body, bronze mounted regrinding bronze seat ring and disc, -Fig. 624

M. Drain Valves: All low points shall have drain valves, with hose ends. Where 1/2" and 3/4" sizes are indicated, "Standard" hose end drain valves shall be used. Provide brass hose end drain caps at each drain valve. Where larger than 3/4" drains are shown, gate valve shall be used. Provide brass nipples and reducer from drain valve size to 3/4" terminating with 3/4" hose end drain valve and cap.

2.3 FITTINGS

A. Nipples

1. All nipples shall have clean cut threads and shall be made from new pipe, standard weight for all lengths, except that close and shoulder nipples shall be extra heavy.

2. Fittings - 2-1/2 and Smaller: All fittings shall be standard weight steam pattern gray cast iron, Grinnell, Stockholm or equal approved.

3. Fittings - 3" and Larger: The Contractor has the option to use screwed, flanged or welded fittings so long as all ASME requirements are met.

B. Joints and Unions

1. Threaded joints shall be full and clean cut. The ends of pipe shall be reamed to the full inside diameter, all burrs shall be removed and no more than three threads shall be exposed beyond fittings when made up. Joints shall be made up tight with graphite base pipe joint compound. Exposed threads of ferrous pipe shall be painted with acid-resisting paint after caulking, lampwick or other material will be allowed for correction of defective joints.

2. Flange joints shall be made up perfectly square and tight. Screwed flanges and loose flanges shall be cast iron and welding flanges shall be steel. Flanges shall be faced true and bolted up tight with 1/16" Carlock ring type gasket.

3. Bolts shall be high quality steel with hexagon nuts and heads. The Contractor shall apply grease to threads of bolt.

4. Welded joints in piping shall be by the electric or oxyacetylene process using welding rods if the characteristics similar to pipe material and as recommended by the pipe manufacturer and shall be done in accordance with the ASME Code for pressure piping. Welding shall be done by qualified welders under the requirements of the ASME Boiler and Pressure Vessel Code.

5. The pipe lengths shall be aligned with welding rings and the abutting pipe ends shall be concentric. Prior to welding, the groove and adjacent surfaces shall be thoroughly cleaned of all grease, scale or rust. During welding, all slag, or flux remaining on the bead shall be removed before laying down the next bead. The welding metal shall be thoroughly fused with the base metal at all sections of the weld. Short lengths of pipe may be beveled on the job with oxyacetylene torch, provided all scale and oxides are removed.

6. Joints shall be butt-welded, single V-type. All fittings shall be steel welding fittings. Elbows and fittings formed with coupling or welded cut pipe sections shall not be acceptable.

7. Bonney Weldolets or welding saddles may be used for branch connections, which are less than one-half the size of the main to which they connect.

8. Ground Joint Unions, Flange Connections, Reaming & Filling Ground joint unions shall be 200 lb. s.w.p. for brass. Flanges shall be 150 lb. s.w.p. for brass, 125 lb. s.w.p. for cast iron.

9. Ground joint unions of flanges shall be used only on exposed accessible piping. Where concealed, right and left nipples and couplings must be used. Where flanged connections are used, full size gaskets must be inserted.

C. Threads: Shall be standard, clean cut and tapered. All piping shall be reamed free from burrs. All piping shall be kept free of scale and dirt. Caulking of threads will not be permitted. All piping shall be threaded and made up in accordance with the current edition of the ASA Standard Specifications for pipe threads.

D. Unions

1. Unions for use on ferrous pipe 2" and smaller shall be malleable iron with brass to iron ground joint spherical seat and threaded connections. Unions 2 1/2" and over shall be flanged type with gasket.

2. Unions for copper tubing shall be cast bronze conforming to ASA B16. The Contractor shall furnish adapters where required for copper pipe.

3. Where copper pipe connects to ferrous pipe or metals, the Contractor shall furnish EPCO isolating type dielectric unions. Plastic type isolating bushings are not acceptable.

4. Unions shall be installed wherever necessary for repair or replacement of equipment, valves, strainers, etc. Final connections to equipment shall be made in a manner that will permit removal without cutting of pipelines.

E. Solder

1. All sweat joints shall be made up with lead and antimony free solder.
2. Solder shall be National Lead or approved equal. Flux shall be non-toxic and non-corrosive.
3. All copper tubing ends shall be reamed, filed and cleared of burrs and rough edges. All pipes shall be reamed after cutting and threading.

F. Expansion

1. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted.

2. Branches shall be of sufficient length and have 3 elbow swings to allow for pipe expansion.

3. Provide expansion joints, guides and anchors equal to “Flexonics” Type HCF where indicated on Drawings or where necessary for proper expansion compensation. Submit shop drawing.
4. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.

5. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of the Contractor.

6. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.4 PIPING SLEEVES

A. Furnish sleeves built into place for all piping passing through walls, floors or building construction. Sleeves, not less than 1/2” larger in diameter than piping and its covering, if any, and extending full depth of construction pierced. Pack sleeves through walls/floors in accordance with Underwriters' Requirements.

B. Sleeves piercing exterior walls, integral waterproofed walls shall be standard weight steel piping. Furnish welded center flange buried in construction for sleeves through exterior walls below grade. At exterior walls, make pipes watertight in sleeves with oakum packing and caulked lead joints on both sides of wall. All other sleeves: Galvanized sheet steel with lockseam joints, #22 USSG for 3” or under. Sleeves for piping 4” and larger, #18 USSG.

C. Pipes passing through interior membrane waterproofed floors, cast iron flashing sleeve, with integral flashing flange and clamping ring, similar to Josam Series #1880. Adjust sleeves to floor construction with steel or wrought iron pipe nipples top and bottom, extending 3" above finished floor. Burn & J.R. Smith are equal.

D. Pipes passing through membrane waterproofed walls, cast iron flashing sleeve with internal flashing flange and clamping ring similar to Josam Series #1870. Make pipes watertight in sleeves with oakum packing and caulked lead joints. Burn & J.R. Smith are equal.

E. For flashing sleeves specified in Pars. C and D, lead flashing extended at least 10" around flashing sleeves, securely held in place by clamping device.

2.5 PIPING ENCLOSURES

A. Where concealed piping in ceilings and wall of finished spaces is not possible vertical or horizontal metal piping enclosures equal to "Sterling" model PCH (horizontal) or PCHV (vertical). Provide all required hangers, supports, corners, brackets, etc. color per Architect.

PART 3 - EXECUTION

3.1 GENERAL NOTES - PIPING NOTES, DRAINING, VENTING AND MISCELLANEOUS WATER SPECIALTIES

A. Piping shall be installed as indicated on Drawings. Elevations and dimensions are indicated as a guide only and are subject to change with actual job conditions.

B. Except for drainage piping, which shall pitch down with flow, mains shall pitch upward or be installed dead level as indicated. Horizontal runs shall be parallel to walls.

C. In general, all branch connections shall be top of bottom 45 degree or 90 degree, pitching up or down from mains.

D. Where indicated, flexible connectors shall be installed. All final connections to equipment, pumps, units, etc. shall have companion flanged, flange unions or ground joint unions. (125 lbs.)

E. All piping shall be adequately supported with approved type hangers so as to prevent absolutely any sagging of lines, or any undue strain on pipes or fittings. All pipe lines shall be capped during construction to prevent entry of dirt or other foreign material. All piping lines after erection shall be blown or flushed out to render the piping system as clean as possible before system water is added for operation.

F. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

G. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

H. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.2 DRAINING

A. All low points shall have drain valves with hose ends. Where 1/2" and 3/4" sizes are indicated, "Standard" hose end drain valves shall be used. Provide brass hose end drain caps at each drain valve. Where larger than 3/4" drains are shown, gate valve shall be used. Provide brass nipple and reducer from drain valve size to 3/4" terminating with 3/4" hose end drain valve and cap.

3.3 VENTING (For Hot Water)

A. All high points in piping shall be vented automatically with float vents. At all high points of piping, whether specifically indicated or not, provide Maid-o-Mist or B&G No. 7 or 27 Air Eliminators with shut off cock, auxiliary key vent and copper tubing overflow carried to floor along wall as indicated or directed.

3.4 WATER SPECIALTIES

A. Air Vents: Install at all high points automatic air vents to eliminate air binding. All automatic air vents shall be approved heavy duty type equipped with petcocks and tubing for manual venting. All vents installed in coils, etc. shall be of manual key operated type. All vents concealed from view shall be accessible through access doors. Vents shall be by Hoffman, Anderson or Bell & Gossett, 125 psig rated.

B. Pressure Gauge: Furnish and install pressure gauges on suction and discharge sides of each pump and as required to check operation of equipment; pressure gauges shall have 4-1/2" diameter dials, Ashton, Ashcroft or approved equal.

C. Install thermometers at all locations in piping system as noted on Drawings and as required to check system performance. Thermometers shall be installed at the supply and return of coils and 3-way diverting valves as manufactured by Trerice, Weksler or Moeller, with 4-1/2 inch face, cast aluminum case, chrome plated steel ring, white background with black embossed markings, glass window, stainless steel pointer, brass movement, 316 stainless steel bulb. Provide separable, universal angle sockets for all thermometers.

END OF SECTION

SECTION 23 0415

PIPING, FITTINGS, VALVES AND NOTES (STEAM)

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 PIPING NOTES

A. The Contractor shall erect all pipe, fittings, valves, hangers, anchors, expansion joints and all accessories specified, indicated on the Drawings or required to assure proper operation of all piping systems installed under this Contract. All piping shall be maintained at a proper level to assure satisfactory operation, venting and drainage. Piping and valves in any locality where possible shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance.

B. All piping shall be new and of the material and weight specified under various services. Steel and wrought iron pipe 2" and larger shall be seamless or lap welded. All piping shall have the maker's name and brand rolled on each length of pipe.

C. All piping, fittings, valves and strainers shall be cleaned of grease, dirt and scale before installation. All temporary pipe openings shall be kept closed during the performance of the work. The ends of all piping shall be reamed smooth and all burrs removed before installation.

D. All piping shall be cut accurately to measurements taken on the job. Offset connections shall be installed alignment of vertical to horizontal piping and where required to make a true connection and to provide for expansion. Bent or sprung pipe shall not be installed where shown on Drawings and where necessary to provide for expansion of piping. Cold spring hot lines one-half estimated distance of maximum expansion. Suitable pipe anchors shall be installed where shown or required.

E. Piping connections shall have unions where necessary for replacement and repair of equipment. Gate valves and controls valves shall be installed where shown and where necessary for proper operation and service.

F. Vertical piping shall be plumb and horizontal piping shall be parallel to walls and partitions. Piping shall be supported as required to prevent the transmission of noise and vibration.

G. Work shall include all pipe, fittings, offsets and requirements for the installation of piping of other work including ducts and conduit. Reducing fittings shall be used where pipe changes size. All piping shall be installed with ample clearance to center accurately in sleeves through floors, and walls and partitions.

H. Piping shall be downgraded to drain connections at low points.

PART 2 - PRODUCTS

2.1 PIPING

A. All piping installed under this Section of the Specifications shall be in accordance with the following schedule.

1. Piping for low pressure shall be standard weight black steel pipe Schedule 40, Grade A53, black steel and Schedule 80, Grade A53 for medium and high pressure. All steam condensate piping shall be Schedule 80, Grade A53. Pipe 2" and smaller, cast iron screwed fittings. Pipe 2-1/2" and larger, steel welding fittings. Pipe and fittings as manufactured by National, Wheeling, Bethlehem or equal, manufactured in accordance with ASTM current edition. All pipes must be reamed before installation.

2. All drainage pipe lines, 2" larger except where galvanized screw pipe is shown on the Drawings or specified hereafter, shall be extra heavy cast iron soil pipe and fittings.

B. Threaded short and close nipples shall be Schedule 80, extra heavy weight of the same material as pipe in system in which they are installed.

2.2 VALVES

A. All valves, unless specified or noted otherwise, shall be designed for a working pressure of not less than 200 psi water or 125 psi steam with name and pressure rating of valve cast in body. All valves shall be of the same manufacturer, unless specified otherwise. Valves for cut-off shall be gate valves, unless otherwise specified.

B. All valves of same manufacturer: similar to Jenkins Bros., Walworth, Kennedy or approved equal.

C. Four inch and larger, flanged; smaller sizes, screwed.

D. All Gate and Globe valves shall be installed with handle in an upright position.

E. The Contractor shall furnish and install all valves shown on Drawings and all valves that are necessary for proper operation and maintenance of systems and equipment. All piping connections to each piece of equipment and all branch connections to mains shall have cut-off valves.

F. The following schedule of valves for steam, condensate, etc. is based on Jenkins Brothers, Inc. catalog numbers (except as noted); equivalent Lukenheimer, Walworth, O-I-C, Crane Fairbanks Company valves will be acceptable.

G. Gate Valves

1. Up to 2": Bronze gate solid wedge, inside screw traveling stem union bonnet, -Fig. 47U.
2. 2-1/2" and 3": Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 650-A.
3. 4" and larger: Iron body, bronze-mounted gate, solid wedge, OS&Y rising stem, -Fig. 651-A.
4. Provide chain wheel gear operator on all valves installed 7 feet or higher.

2.3 FITTINGS

A. Nipples

1. All nipples shall have clean cut threads and shall be made from new pipe, standard weight for all lengths, except that close and shoulder nipples shall be extra heavy.

2. Fittings - 2-1/2 and Smaller: All fittings shall be standard weight steam pattern gray cast iron, Grinnell, Stockholm or equal approved.

3. Fitting - 3" and Larger: The Contractor has the option to use screwed, flanged or welded fittings so long as all ASME requirements are met.

B. Joints and Unions

1. Threaded joints shall be full and clean cut. The ends of pipe shall be reamed t o the full inside diameter, all burrs shall be removed and no more than three threads shall be exposed beyond fittings when made up. Joints shall be made up tight with graphite base pipe joint compound. Exposed threads of ferrous pipe shall be painted with acid-resisting paint after caulking, lampwick or other material will be allowed for correction of defective joints.

2. Flange joints shall be made up perfectly square and tight. Screwed flanges and loose flanges shall be cast iron and welding flanges shall be steel. Flanges shall be faced true and bolted up tight with 1/16" Carlock ring type gasket.

3. Bolts shall be high quality steel with hexagon nuts and heads. The Contractor shall apply grease to threads of bolt.

4. Welded joints in piping shall be by the electric or oxyacetylene process using welding rods if the characteristics similar to pipe material and as recommended by the pipe manufacturer and shall be done in accordance with the ASME Code for pressure piping. Welding shall be done by qualified welders under the requirements of the ASME Boiler and Pressure Vessel Code.

5. The pipe lengths shall be aligned with welding rings and the abutting pipe ends shall be concentric. Prior to welding, the groove and adjacent surfaces shall be thoroughly cleaned of all grease, scale or rust. During welding, all slag, or flux remaining on the bead shall be removed before laying down the next bead. The welding metal shall be thoroughly fused with the base metal at all sections of the weld. Short lengths of pipe may be beveled on the job with oxyacetylene torch, provided all scale and oxides are removed.

6. Joints shall be butt-welded, single V-type. All fittings shall be steel welding fittings. Elbows and fittings formed with coupling or welded cut pipe sections shall not be acceptable.

7. Bonney Weldolets or welding saddles may be used for branch connections, which are less than one-half the size of the main to which they connect.

8. Ground Joint Unions, Flange Connections, Reaming & Filling Ground joint unions shall be 200 lb. s.w.p. for brass. Flanges shall be 150 lb. s.w.p. for brass, 125 lb. s.w.p. for cast iron.

9. Ground joint unions of flanges shall be used only on exposed accessible piping. Where concealed, right and left nipples and couplings must be used. Where flanged connections are used, full size gaskets must be inserted.

C. Threads: Shall be standard, clean cut and tapered. All piping shall be reamed free from burrs. All piping shall be kept free of scale and dirt. Caulking of threads will not be permitted. All piping shall be threaded and made up in accordance with the current edition of the ASA Standard Specifications for pipe threads.

D. Unions

1. Unions for use on ferrous pipe 2" and smaller shall be malleable iron with brass to iron ground joint spherical seat and threaded connections. Unions 2 1/2" and over shall be flanged type with gasket.

2. Unions shall be installed wherever necessary for repair or replacement of equipment, valves, strainers, etc. Final connections to equipment shall be made in a manner that will permit removal without cutting of pipelines.

E. Expansion

1. The entire piping installation shall be installed with adequate provision for expansion. No rigid connections will be permitted.

2. Branches shall be of sufficient length and have 3 elbow swings to allow for pipe expansion.

3. Provide expansion joints, guides and anchors equal to “Flexonics” Type HCF where indicated on Drawings or where necessary for proper expansion compensation. Submit shop drawing.

4. Any breaks in the piping within the guarantee period due to improper provision for expansion must be replaced at the expense of this Contractor, and the conditions corrected to prevent future recurrence.

5. Any damages to surrounding areas and equipment due to this failure shall also be repaired and paid for at the expense of the Contractor.

6. Joints to have 150 psi rating, ANSI-B16.5 with liner and cover.

2.4 PIPING SLEEVES

A. Furnish sleeves built into place for all piping passing through walls, floors or building construction. Sleeves, not less than 1/2” larger in diameter than piping and its covering, if any, and extending full depth of construction pierced. Pack sleeves through walls/floors in accordance with Underwriters' Requirements.

B. Sleeves piercing exterior walls, integral waterproofed walls shall be standard weight steel piping. Furnish welded center flange buried in construction for sleeves through exterior walls below grade. At exterior walls, make pipes watertight in sleeves with oakum packing and caulked lead joints on both sides of wall. All other sleeves: Galvanized sheet steel with lockseam joints, #22 USSG for 3” or under. Sleeves for piping 4” and larger, #18 USSG.

C. Pipes passing through interior membrane waterproofed floors, cast iron flashing sleeve, with integral flashing flange and clamping ring, similar to Josam Series #1880. Adjust sleeves to floor construction with steel or wrought iron pipe nipples top and bottom, extending 3” above finished floor. Burn & J.R. Smith are equal.

D. Pipes passing through membrane waterproofed walls, cast iron flashing sleeve with internal flashing flange and clamping ring similar to Josam Series #1870. Make pipes watertight in sleeves with oakum packing and caulked lead joints. Burn & J.R. Smith are equal.

E. For flashing sleeves specified in Pars. C and D, lead flashing extended at least 10” around flashing sleeves, securely held in place by clamping device.

2.5 PIPING ENCLOSURES

A. Where concealed piping in ceilings and wall of finished spaces is not possible vertical or horizontal metal piping enclosures equal to “Sterling” model PCH (horizontal) or PCHV (vertical). Provide all required hangers, supports, corners, brackets, etc. color per Architect.

2.6 ESCUTCHEONS

A. Furnish tamperproof pipe escutcheons at all surfaces where exposed piping bare or covered, passes through walls, ceilings, floors or partitions.

B. Escutcheons: Stamped sheet metals, chromium plated over copper on all surfaces and satin finish on exposed side. Fasten escutcheons securely to pipe sleeves or to extensions of sleeves without any part of sleeve or extension being visible; escutcheons held in place by tamperproof screws and on covered pipe by internal spring tension, tamperproof.

C. Where sleeves or fittings project slightly from wall, partitions, floor or ceiling, provide special deep type escutcheons.

PART 3 - EXECUTION

3.1 GENERAL NOTES

A. Piping shall be installed as indicated on Drawings. Elevations and dimensions are indicated as a guide only and are subject to change with actual job conditions.

B. Mains shall pitch upward or be installed dead level as indicated. Horizontal runs shall be parallel to walls.

C. In general, all branch connections shall be top of bottom 45 degree or 90 degree, pitching up or down from mains.

D. All piping shall be adequately supported with approved type hangers so as to prevent absolutely any sagging of lines, or any undue strain on pipes or fittings. All pipe lines shall be capped during construction to prevent entry of dirt or other foreign material. All piping lines after erection shall be blown or flushed out to render the piping system as clean as possible before system water is added for operation.

END OF SECTION

SECTION 23 0420

SUPPORTS, SLEEVES AND PLATES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. This Contractor shall furnish and install all plates, hangers and supports for his equipment including piping, headers, fans expansion tank, ductwork, etc.

B. All ductwork, piping and equipment shall be hung or supported from structural members only.

PART 2 - PRODUCTS

2.1 PIPING, DUCTWORK AND EQUIPMENT

A. All piping shall be supported from building structure in a neat and workmanlike manner wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. Use of wire perforated metal to support pipes will not be permitted. Hanging pipes from other pipes will not be permitted.

B. Necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations shall be furnished and installed. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.

C. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot.

D. Pipe hangers shall be as manufactured by Grinnell, whose catalog numbers are given herein, or equivalent Carpenter and Paterson, or F&S Mfg. Co.

E. Piping shall be supported as follows unless otherwise indicated on the Drawings:

1. Heating piping shall be 1-1/2 " and smaller Fig. #260 adjustable clevis hanger. 2" and larger Fig. #174 one-rod swivel roll hanger.

2. Two-rod hangers shall be used for piping close to the ceiling slab or where conditions prohibit use of other hanger types.

3. Anchors for hanger rods shall be Phillips "Red Head" self-drilling type. Anchors shall be placed only in vertical surfaces.

4. Spacing of pipe supports shall not exceed 8 feet for pipes up to 1-1/2" and 10 feet on all other piping.

5. Hangers shall pass around insulation and a 16 gauge steel protective cradle; 12" long shall be inserted between hangers and insulation. Insulation under cradle shall be high density calcium silicate or approved equal to prevent crushing.

6. All piping shall be supported to allow free movement where expanding or contracting. Pipe shall be anchored as required or directed.

7. All lateral runs of piping shall be securely supported on hangers, rolls, brackets, etc. and in manner to allow for proper expansion and elimination of vibration.

8. 2" and smaller pipe, where run on walls, shall be supported on wrought iron "J" hook brackets with anchor bolts.

9. All horizontal pipes, where run overhead or on walls, shall be supported as follows unless otherwise indicated: On adjustable steel clevis type hangers suspended on hanger rods, pipe sizes up to and including 4".

F. Space limitations in hung ceilings spaces and conditions in other locations may require use of other type of hangers than those specified above. Suitable and approved pipe hangers shall be provided for such job conditions.

G. All supports shall be fastened to structural members or additional steel supports furnished by this Contractor.

H. Hanger rods shall be steel, threaded with nuts and lock nuts sizes in accordance with the following schedule:

Pipe Size	Rod Size
3/4" to 2" inclusive	3/8"
2-1/2" and 3' inclusive	1/2"
4" and 5" inclusive	5/8"

I. Hangers for copper tubing shall be tacked up with formed lead sheet on which tubing or pipe shall be placed.

J. Where pipes pass through masonry, concrete walls, foundations, or floors, this Contractor shall set sleeves as are necessary for passage of pipes. These sleeves shall be of sufficient size to permit insulation where required to be provided around pipe passing through. This Contractor shall be responsible for exact location of these sleeves.

K. Sleeves shall not be used in any portion of building where use of same would impair strength of construction features of the building. Inserts for supporting lateral pipes and equipment shall be placed and secured to form work, and all sleeves inserts locations shall be thoroughly checked with Architect so as not to conflict with other trades.

L. Where pipes pass through floor or walls, they shall be provided with chromium plated escutcheons.

M. Anchor horizontal piping where indicated and wherever necessary to localize expansion or prevent undue strain on branches. Anchors: Heavy forged construction entirely separate from supports.

N. Anchor vertical piping wherever indicated and wherever necessary to prevent undue strain on offsets and branches. Anchors, unless otherwise noted: Heavy steel clamps securely bolted and welded to pipes. Extension ends shall bear on building construction.

O. Ducts shall be hung with 1" x 1/8" metal straps. When width of duct is less than 48", hangers shall be fastened to side of ducts. Auxiliary steel supports that may be required for all mechanical equipment shall be furnished and installed by this Contractor. All operating equipment including fans, piping, etc. shall be supported so as to produce minimum amount of noise transmission.

P. Refer to "General Conditions" as well.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0430

INSULATION AND COVERINGS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Furnish insulation for all piping, equipment and sheet-metal work as noted.

B. Insulate no piping, ducts or equipment until tested and approved for tightness. All piping and ducts shall be dry when covered. Where existing insulation has been damaged, altered of removed during the course of the work, it shall be replaced with new insulation in a neat manner to match the adjacent insulation.

C. All insulation must be done by an approved Sub-Contractor or by mechanics skilled in this line of work.

D. Fire hazard classification shall be 2550 per ASTM E-84, NFPA 255 and UL 723. Insulation shall be rated non-combustible type classified flame spread - 25, smoke developed - 50.

E. The project is following IECC for compliance path.

PART 2 - PRODUCTS

2.1 DUCTWORK (INDOOR)

A. Supply, outside air intake and exhaust (on discharge side of fan) and return ductwork shall be covered with 2" fiberglass insulation (unless otherwise indicated) with aluminum foil vapor barrier. All joints shall be lapped so maximum coverage is achieved.

B. All insulated ductwork shall be insulated with fiberglass board insulation with canvas finish in areas where ductwork is exposed.

C. Insulation thickness shall be in accordance with the latest edition of the State Energy Code.

D. Thermal acoustic lining of ductwork where indicated shall be 1" thickness closed cell non-fiberglass unless otherwise noted. The lining shall have a mat facing and shall meet the Life Safety Standards as established by NFPA 90A and 9B and conform to the requirements of ASTMC 1071.

2.2 DUCTWORK (INDOOR EXPOSED IN MECHANICAL ROOMS)

A. All exposed ductwork shall be insulated with 2" thick rigid insulation and vapor barrier.

2.3 DUCTWORK (OUTDOOR)

A. All exposed ductwork shall be insulated with 2" thick rigid insulation. Ductwork shall also be lined with 1" thickness closed cell non-fiberglass insulation

B. Cover insulation watertight with 15lb. roofing felt and two coats of vapor proof mastic or composite membrane of embossed UV resistant aluminum foil/polymer laminate with inner layer of rubberized asphalt and outer layer of polymer film.

C. Make proper provision with ductwork support(s) so that is not crushed.

2.4 PIPING/EQUIPMENT (INDOOR)

A. All new heating water system supply and return and steam piping shall be covered with Manville Micro-Lok or equal approved fiberglass insulation with all service (factory applied) vapor retardant jacket. Seal with type H mastic.

B. Fittings shall be insulated with same material and thickness as adjoining pipe insulation and shall be pre-molded fittings or mitre cut segmental insulation wired on. Over the insulation, apply a wrapper of OCF glass cloth sealed with type H mastic. Apply aluminum bands on pipe covering in addition to self-sealing feature.

C. Insulation Material: Molded fibrous glass insulation, density not less than 4 lbs. per cubic foot.

D. Insulation Thickness: Shall be in accordance with the latest edition of the State Energy Code.

E. Jacket and Finish: White flame retardant type, meeting all requirements of "Fire Hazard Classification" of NFPA, similar to "Fiberglass" Type FRJ, Insul-Coustic, Johns-Manville or approved equal.

F. Insulation and Finishes for Fittings, Valves and Flanges

1. Valves, fittings and flanges other than vapor seal insulation: Insulated in same manner and same thickness as piping in which installed.

2. Use pre-molded sectional covering where available; otherwise use mitered segments of pipe covering.

3. Obtain written approval prior to using other than molded sectional covering.

G. Vapor seal Insulation for Valves, Fittings and Flanges: Same as above, except joints sealed with vapor barrier adhesive and wrapped with glass mesh tape. Each fitting shall be finished with two coats of vapor seal mastic adhesive.

H. Jacket and Finishes: Exposed fittings - 6 oz. canvas jacket adhered with lagging adhesive.

I. Concealed fittings: Standard weight canvas jacket adhered with lagging adhesive and with bands of 18 gauge copper coated steel - 2 bands at elbows, 3 at tee.

J. Insulation at Pipe Hangers

1. Where shields are specified at hangers on piping with fibrous glass covering, provide load bearing calcium silicate between shields and piping as follows:

a. For pipe covering without vapor barrier jacket, furnish at each shield 12" - long calcium silicate section with canvas section with canvas jacket continuous between shield and insulation.

b. For pipe covering with vapor barrier jacket, furnish at each shield 12" - long vapor barrier jacket section with section of fibrous glass replaced with section of calcium silicate. Vapor barrier jacket, continuous between shield and insulation for continuous vapor barrier.

K. Condensate drain and refrigerant piping shall be insulated with 1/2” Imcosheild un-split polyolefin insulation.

L. Equipment

1. Secure fibrous glass block or board insulation in place with wire or galvanized steel bands.

   a. Small Areas: Secure insulation with 16 gauge wire on maximum 6" centers.

   b. Large Areas: Secure insulation with 14 gauge wire or .015" thick by 1/2" wide galvanized steel bands on maximum 10" centers. Stagger insulation joints.

   c. Irregular Surfaces: Where application of block or board insulation is not practical insulate with insulating cement built-up to same thickness as adjoining insulation.

2. Fill joints, voids and irregular surfaces with insulating cement to a uniform thickness.

3. Stretch wire mesh over entire insulated surface and secure to anchors with wire edges laced together.

4. Apply finishing cement, total of 1/2" thick, in 1/4" thick coats. Trowel second coat to a smooth hard finish. Neatly bevel insulation around hand-holes, cleanouts, ASME stamp, manufacturer's nametag and catalog number.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0440

DAMPERS AND MISCELLANEOUS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

PART 2 - PRODUCTS

2.1 DAMPERS AND MISCELLANEOUS

A. Furnish and install where shown on Drawings ARROW PIN-LOCK Dampers No. OBDPL-507 (Opposed) as manufactured by the Arrow Louver & Damper Corp. of Maspeth, NY 11378, or approved equal. Frames and blades to 1/8" extruded aluminum.

B. Blades to be single unit PIN-LOCK design 6" wide, with the PIN-LOCK an integral section within the blade center axis. Frames to be a combination of 4" extruded aluminum channel and angle, with reinforcing bosses and groove inserts for vinyl seals.

C. Pivot rods to be 1/2" diameter extruded aluminum, PIN-LOCK design interlocking into blade section. Bearings to be "Double-Sealed" type with Celcon inner bearing on rod riding in Merlon Polycarbonate outer bearing inserted in frame so that outer bearing cannot rotate.

D. Blade linkage hardware is to be installed in angle or channel frame section out of air stream. All hardware to be of non-corrosive reinforced material or to be cadmium plated.

E. Rod bearing to be designed for minimum air leakage by means of overlapping design and by extruded vinyl seals to fit into integral ribbed groove inserts in both frames and blades. All dampers in excess of 10 sq. ft. free area to have reinforced corners by means of gusset plates.

F. Dampers shall be sized by the Control Manufacturer to properly control the flow of air and ensure minimum air stratification in mixing applications. Sizing shall be submitted for approval with information similar to that submitted on valve when sizing valve.

2.2 FIRE DAMPERS

A. Dampers shall be multi blade construction UL labeled and be installed in accordance with UL 555, with breakaway connections. The units shall have stainless steel actuator springs with locking devices for horizontally mounted type.

2.3 COMBINATION FIRE / SMOKE DAMPERS

A. Furnish and install at locations shown on Drawings, or as described in schedules, combination fire smoke dampers.

B. Frame shall be a minimum of 16 gauge galvanized steel formed into a structural hat channel reinforced at corners for added strength. The blades shall be airfoil shaped single-piece hollow construction with 14 gauge equivalent thicknesses. Blade action shall be opposed. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame for long life. Galvanized bearing shall not be acceptable.

C. Blade edge seals shall be silicone rubber and galvanized steel mechanically locked into blade edge (adhesive or clip fastened seals shall be acceptable) and shall withstand a minimum of 450 degrees F. (232 degrees C.) Jamb seals shall be non-corrosive stainless steel flexible metal compression type to further ensure smoke management.

D. Each combination fire/smoke damper shall be classified for use for fire resistance ratings of less than 3 hours in accordance with UL Standard 555, and shall further be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems in accordance with the latest version of UL555S, and bear a UL label attesting to same. Damper manufacturer shall have tested, and qualified with UL, a complete range of damper sizes covering all dampers, required by this Specification. Testing and UL qualifying a single damper size is not acceptable. The leakage rating under UL555S shall be leakage Class I (4 c.f.m./sq. ft. at 1" w.g. and 8 c.f.m./ft. at 4" w.g.).

E. As part of UL qualification, dampers shall have demonstrated a capacity to operate (to open and close) under HVAC system operating conditions, with pressures of at least 4" w.g. in the closed position, and 4000 f.p.m. air velocity in the open position.

F. In addition to the leakage rating already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. (177 degrees C.). Appropriate electric actuators (equal to Ruskin model MA) shall be installed by the damper manufacturer at time of damper fabrication. Damper and actuator shall be supplied as a single entity, which meets all applicable UL555S qualifications for both dampers and actuators. Damper and actuator assembly shall be factory cycled 10 times to assure operation.

G. Manufacturer shall provide factory assembled sleeve of 17" minimum length (Contractor to verify requirement). Factory supplied caulked sleeve shall be 20 gauge for dampers through 84" wide and 18 gauge above 84" wide.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect equipment space locations before beginning installation. Verify that the space is correct for entry and access. Do not proceed with installation of the equipment until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of equipment, accessories and components.

B. All heating, ventilating and air conditioning equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces. The Contractor shall be required to rectify or replace at his own expense, any equipment not complying with the foregoing requirements.

3.3 CLEANING

A. Clean interior and exterior surfaces promptly after installation of equipment and components. Take care to avoid damage to protective coatings and finishes. Remove excess sealants, lubrication, dirt and other foreign substances.

END OF SECTION

SECTION 23 0460

AUTOMATIC TEMPERATURE CONTROLS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 QUALIFICATIONS OF BIDDER

A. All bidders must be building automation contractors in the business of installing direct digital control building automation systems for a minimum of 10 years.

B. All bidders must have an office in the within 50 miles of jobsite.

C. All bidders must be authorized distributors or branch offices of the manufacturers specified.

D. All bidders must have a trained staff of application Engineers, who have been certified by the manufacturer in the configuration, programming and service of the automation system.

1.2 SCOPE OF WORK

A. This Contractor shall furnish an electronic system of temperature controls. The District has standardized on Andover. All submitted controls shall be directly compatible with existing hardware and software without patch panels or translators or any kind. The ATC Sub-Contractor shall be subject to the District's approval. Communications between the schools is via their Ethernet LAN and remote access is via the Web or Local Intranet. The intent of this specification is to extend and interoperate with this system and to provide a peer-to-peer, networked, distributed control system for the temperature control work that is part of this project. All components, software and operation shall be interoperable with the existing building automation system via the Niagara Framework in the District. The installed system will interface directly with the existing proprietary as well as open protocol systems, including the existing District network, dynamic color graphics software and programming software. The existing software and database will be modified to accept the new equipment being installed under this project to maintain integrity for centralized scheduling, trending, programming and alarming. PC Desktop icons that "link" to a separate EMS system are not acceptable. Any costs associated with connecting to the existing energy management system, including licensed software, programming, training etc. shall be part of the controls contractor's bid. The contractor must demonstrate their ability to perform the integration to the existing Schneider Electric systems prior to submittal acceptance and invoicing.

B. Only licensed software toolsets will be acceptable for integration work. All systems as described in the sequence of operation will be shown via dynamic Web based graphics with all pertinent system alarms for proper operation and maintenance. The use of separate PC workstations, gateways, metalinks, replacement of existing controllers and control devices and additional software graphic packages to accomplish this integration will not be accepted.

C. Prospective bidders shall visit the School District Buildings to verify existing DDC controls equipment and Contractors ability to be compatible with these controls before bid. Contact the Schools Supt. of Buildings and Grounds for details. Contractor shall provide Web based graphics for controlled equipment that matches the functionality and appearance of the graphics already in use on the existing system. Contractor shall configure graphic display to meet Owner and Engineer requirements.

D. The Temperature Controls Contractor (TCC) shall provide each of the following portions of the complete EMCS as a standalone system that can communicate with any other DDC system which is following the same protocol.

1. Operator Workstations: Reuse existing OWS's, software and Databases in the district and provide guaranteed seamless two way communications via the Internet and District LAN, including full control, with both all existing DDC systems currently under control and the DDC system provided as a part of this project.
   The OWS's shall monitor, display, and control information from the DDC systems through one software package. Rebooting of the OWS to access the existing building's multiple systems is not acceptable. Use of separate ": Icons" to access multiple DDC systems is not acceptable. The existing database shall be modified to incorporate the work of this project.

   a. The system OWS's shall meet the hardware and performance requirements of this specification.
   b. The OWS's shall allow customization of the system as described in this specification.

2. The OWS's shall:

   a. Provide new color graphic control screens for all equipment provided or modified as part of this project, as outlined below and on the drawings.
   b. Allow operators to view and work (read and write) all DDC points associated with all DDC equipment provided or modified as part of this project, including all existing DDC points.
   c. Allow for custom graphics and/or control programming generation for any existing or new equipment.
   d. Provide seamless continuity of graphics and existing functionality for all existing Owner's equipment currently under DDC control.

E. All proposed controls contractors that intend on interoperating with the existing DDC system utilizing DDC controls other than those presently installed in the district, shall submit a Technical Proposal, complete with the diagrams, Specifications Compliance Reports, product information, and supporting documentation outlined below. The technical proposal will be utilized to evaluate the methodology that will be used to implement the interoperation and integration of the new controls of this project into the existing district wide energy management system. It will also be used as a basis for vendor qualification on for the project. Arrange the Technical Proposal in order of the specification article numbers.

1. Provide a list of local jobs (three minimum) of similar type and size the bidder has installed, utilizing the products proposed for this project, with owner's representatives' names and telephone numbers for reference. This list should directly reflect:

   a. Projects that include direct integration to third party microprocessor controllers of the type specified within the scope where an integration and interoperation of Lon Works controls has been successfully achieved between two different manufacturers' controls systems.

      - EMCS network wiring diagram showing interconnection of all panels, workstations, system printer(s) etc. A diagram describing system architecture for this project with product code numbers for workstation, network controllers, application specific controllers, transducers, sensors, communication network, etc.

2. Provide information on owner training provided as part of the bid package as well as additional opportunities and factory schools available with associated cost. Include details of operator HVAC Training System as specified herein.

3. Specification Compliance Report. Provide specification compliance report that addresses every paragraph within this specification section utilizing an outline format, as follows:

   a. Comply-bid package complies without exception;

   b. Exception – bid package meets the functional intent, but not the letter of the specification. For each paragraph that an exception is taken, identify all deviations from what is specified in the given paragraph and provide a description of what is excluded, what is included, and how the contractor intends to meet the functional intent;

   c. Does not comply – bid package cannot meet specified function and will not be provided.

   d. For all paragraphs in this specification section, indicates as "Comply" or "Exception" or "Does not comply". Provide and reference factory product documentation to substantiate compliance.

4. Provide a statement that all products used on this project are of current manufacture and are readily available through multiple distribution channels. Products in "field testing" status are not acceptable.

F. The BAS Contractor shall review and study all HVAC Drawings and the entire Specification to familiarize himself with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.

G. Prior to commencement of schedule programming meet with Owner to discuss block/individual scheduling of system/equipment and alarm protocols. Review equipment designations and graphics screens to be provided. Take minutes of this meeting and issue them to the Construction Manager/Owner's representative.

H. All temperature control wiring regardless of voltage shall be done by this Contractor. This shall include power wiring of control panels/components from available spare circuits in electrical panels. The automatic temperature control manufacturer shall provide wiring diagrams, field supervision and one (1) year guarantee on the installed DDC system and three (3) year factory warrantee on all control equipment manufactured by the DDC manufacturer.

I. Thermostats, temperature sensors, heating control devices, etc. are indicated on the Drawings in general. Provide any additional devices required to carry out project intent as herein described.

J. Thermostats/Temperature sensors in areas subject to vandalism shall have in addition separately mounted extra heavy guards. Submit sample.

K. Contractor shall include all new heating control devices, thermostats, etc. indicated on Drawings or that is part of a new system.

L. Contractor shall furnish all necessary electrical controls, motor starters, switches, etc. for proper operation of equipment furnished by him under this Contract, and as herein noted.

M. Point and component lists are to be used as a guide. If the sequence of operation requires additional points/control devices, this Contractor shall be responsible for providing same.

N. All control system components installed shall be manufactured by the DDC system manufacturer.

O. Communications cabling shall be run in hallways above hung ceiling with plenum cable and wiremold where exposed.

P. Removals shall include switches, relays, electric components not required for the new intent. Do not leave behind items with no function. Provide appropriate blanking plates/patching where removals occur in finished spaces.

Q. Provide services and manpower necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor, Owner's representative, and Commissioning Authority.

1.3 SOFTWARE CODE

A. Owner shall be furnished with a complete, hard-bound copy of all installed software code. Final payment shall be contingent upon this requirement being met.

1.4 CODE COMPLIANCE

A. Provide components and ancillary equipment, which are UL-916 listed and labeled.

B. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.

C. All wiring shall conform to the National Electrical Code.

D. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.

E. Comply with FCC, Part 68 rules for telephone modems and data sets.

1.5 SUBMITTALS

A. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the Drawings, the Contractor shall furnish a CD containing the identical information. Drawings shall be B size or larger.

B. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typical will be allowed where appropriate.

C. Submittal data shall contain manufacturer's data on all hardware and software products required by the Specification. Valve damper and airflow station schedules shall indicate size, configuration, capacity and location of all equipment.

D. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs.

E. Submit submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor prior to submitting shall check all Documents for accuracy.

F. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

1.6 SYSTEM STARTUP AND COMMISSIONING

A. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the commissioning phase. A written report will be submitted to the Owner indicating that the installed system has been started and balanced in accordance with the Drawings and Specifications.

B. The ATC Contractor shall set in operating condition all major equipment and systems, such as heating, DX cooling, heat recovery and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives. The ATC contractor shall work with the Commissioning Authority as required until all associated HVAC equipment is fully commissioned to the satisfaction of the Commissioning Authority.

B. The ATC Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor, Balancing Contractor, and Commissioning Authority in testing, adjusting, and balancing all systems in the building Scope of Work. The Contractor shall have a trained technician available on request during the balancing and commissioning of the systems. The Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and Commissioning Authority and shall include all labor and materials in his Contract.

C. Refer to specification section 23 0485 HVAC Systems Commissioning.

1.7 OPERATING AND MAINTENANCE MANUALS

A. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation and parts procurement for the entire system. This documentation shall include specific part numbers and software versions and dates. A complete list of recommended spare parts shall be included with the lead-time and expected frequency of use of each part clearly identified.

B. Following project completion and testing, the Contractor will submit As-Built Drawings reflecting the exact installation of the system. The as-built documentation shall also include a copy of all application software both in written form and on CD.

1.8 WARRANTY

A. The Contractor shall provide system warranty for 12 months after system acceptance or beneficial use by the Owner. During the warranty period, the Contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the Sequence of Operation section of the Specification.

B. Updates to the manufacturer's software shall be provided at no charge during the warranty period.

1.9 SPECIFICATION NOMENCLATURE

A. Acronyms used in this specification are as follows:

1. EMCS Energy Management and Control System
2. NAC Network Area Controller
3. IDC Interoperable Digital Controller
4. FUI Full User Interface
5. BUI Browser User Interface
6. POT Portable Operator's Terminal
7. PMI Power Measurement Interface
8. DDC Direct Digital Controls

9. LAN Local Area Network
10. WAN Wide Area Network
11. OOT Object Oriented Technology
12. PICS Product Interoperability Compliance Statement

PART 2 - PRODUCTS

2.1 GENERAL

A. The Energy Management Control System (EMCS) shall be comprised of a network of interoperable, stand-alone digital controllers, a computer system, graphical user interface software, portable operator terminals, printers, network devices and other devices as specified herein.

B. The installed system shall provide secure password access to all features, functions and data contained in the overall EMCS.

2.2 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate Lon Works and Schneider Electric Network 8000 technology communication protocols in one open, interoperable system.

B. The programming computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI / ASHRAE™ Standard 135-1995, to assure interoperability between all system components is required. For each Lon Works device that does not have Lon Work certification, the device supplier must provide an XIF file for the device. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.

C. The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open Database Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database or proprietary user interface programs shall not be acceptable.

D. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.

1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.

2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.3 NETWORKS

A. The Local Area Network (LAN) shall be either a 10 or 100 Megabits/sec Ethernet network supporting, Java, XML, HTTP, and CORBA IIOP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (NACs), Browser User Interfaces (BUIs) and/or Full User Interfaces (FUIs).

B. Local area network minimum physical and media access requirements:
1. Ethernet; IEEE standard 802.3

2. Cable; 10 Base-T, UTP-8 wire, category 5
3. Minimum throughput; 10 Mbps, with ability to increase to 100 Mbps

2.4 NETWORK ACCESS

A. Remote Access

1. For Local Area Network installations, provide access to the LAN from a remote location, via the Internet. The owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, and ISDN line, T1 Line or via the customer's Intranet to a corporate server providing access to an Internet Service Provider (ISP). Owner agrees to pay monthly access charges for connection and ISP.

2. Where no Local Area Network exists, EMCS supplier shall provide the following:
   a. 8 Port Ethernet hub (3Com, or equal)
   b. Ethernet router (Cisco or equal)

3. The owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line or T1 Line. Owner agrees to pay monthly access charges for connection and ISP.

2.5 NETWORK AREA CONTROLLER (NAC)

A. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of Lon Works controller data
7. Network Management functions for all Lon Works based devices

B. The Network Area Controller must provide the following hardware features as a minimum:

1. One Ethernet Port -10 / 100 Mbps.
2. One RS-232 port.
3. One Lon Works Interface Port – 78KB FTT-10A.
4. Battery Backup.
5. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
6. The NAC must be capable of operation over a temperature range of 0 to 55°C.
7. The NAC must be capable of withstanding storage temperatures of between 0 and 70°C.
8. The NAC must be capable of operation over a humidity range of 5 to 95% RH, non-condensing.

C. The NAC shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.

D. The NAC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.

E. Event Alarm Notification and Actions

1. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
2. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
3. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
   a. To alarm
   b. Return to normal
   c. To fault
4. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
5. Provide timed (schedule) routing of alarms by class, object, group, or node.
6. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

F. Control equipment and network failures shall be treated as alarms and annunciated.

G. Alarms shall be annunciated in any of the following manners as defined by the user:

1. Screen message text
2. Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
   a. Day of week
   b. Time of day
   c. Recipient
3. Pagers via paging services that initiate a page on receipt of email message
4. Graphic with flashing alarm object(s)
5. Printed message, routed directly to a dedicated alarm printer

H. The following shall be recorded by the NAC for each alarm (at a minimum):

1. Time and date
2. Location (building, floor, zone, office number, etc.)
3. Equipment (air handler #, access way, etc.)
4. Acknowledge time, date, and user who issued acknowledgement.
5. Number of occurrences since last acknowledgement.

I. Alarm actions may be initiated by user defined programmable objects created for that purpose.

J. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.

K. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.

L. Provide a "query" feature to allow review of specific alarms by user-defined parameters.

M. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.

N. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

2.6 DATA COLLECTION AND STORAGE

A. The NAC shall have the ability to collect data for any property of any object and store this data for future use.

B. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:

1. Designating the log as interval or deviation.

2. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.

3. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.

4. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.

5. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.

C. All log data shall be stored in a relational database in the NAC and the data shall be accessed from a server (if the system is so configured) or a standard Web Browser.

D. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.

E. All log data shall be available to the user in the following data formats:
1. HTML
2. XML
3. Plain Text
4. Comma or tab separated values

F. Systems that do not provide log data in HTML and XML formats at a minimum shall not be acceptable.

G. The NAC shall have the ability to archive its log data either locally (to itself), or remotely to a server or other NAC on the network. Provide the ability to configure the following archiving properties, at a minimum:
1. Archive on time of day.
2. Archive on user-defined number of data stores in the log (buffer size).
3. Archive when log has reached its user-defined capacity of data stores.
4. Provide ability to clear logs once archived.

2.7 AUDIT LOG

A. Provide and maintain an Audit Log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally (to the NAC), to another NAC on the network, or to a server. For each log entry, provide the following data:
1. Time and date
2. User ID
3. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

2.8 DATABASE BACKUP AND STORAGE

A. The NAC shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.

B. Copies of the current database and, at the most recently saved database shall be stored in the NAC. The age of the most recently saved database is dependent on the user-defined database save interval.

C. The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

2.9 INTEROPERABLE DIGITAL CONTROLLER (IDC)

A. Controls shall be microprocessor based Interoperable Lon Mark™ or Lon Works Controllers (IDC). Where possible, all Interoperable Digital Controllers shall bear the applicable Lon Mark™ interoperability logo on each product delivered.

B. HVAC control shall be accomplished using Lon Mark™ based devices where the application has a Lon Mark profile defined. Where Lon Mark devices are not available for a particular application, devices based on Lon Works shall be acceptable. For each Lon Works device that does not have Lon Mark certification, the device supplier must provide an XIF file for the device. Publicly available specifications for the Applications Programming Interface (API) must be provided for each Lon Works / Lon Mark controller defining the programming or setup of each device. All programming, documentation and programming tools necessary to set up and configure the supplied devices per the specified sequences of operation shall be provided.

C. The Lon Works network trunk shall be run to the nearest Network Area Controller (NAC). A maximum of 126 devices may occupy any one Lon Works trunk and must be installed in buss architecture using the appropriate trunk termination device. All Lon Works and Lon Mark devices must be supplied using FTT-10A Lon Works communications transceivers.

D. The Network Area Controller will provide all scheduling, alarming, trending, and network management for the Lon Mark / Lon Works based devices.

E. The IDCs shall communicate with the NAC at a baud rate of not less than 78.8K baud. The IDC shall provide LED indication of communication and controller performance to the technician, without cover removal.

F. All IDCs shall be fully application programmable and shall at all times maintain their LONMARK certification. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications. All control sequences within or programmed into the IDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

G. The supplier of any programmable IDC shall provide one copy of the manufacturer’s programming tool, with documentation, to the owner.

2.10 FULL USER INTERFACE SOFTWARE (EXISTING)

A. Operating System: The FUI shall run on Microsoft Windows NT Workstation 4.0, Service Pack 4 or later.

B. The FUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

C. Real-Time Displays. The FUI, shall at a minimum, support the following graphical features and functions:

1. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the FUI shall support the use of scanned pictures.

2. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.

3. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.

4. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
   a. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
   b. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

5. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

6. Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required.

D. System Configuration: At a minimum, the FUI shall permit the operator to perform the following tasks, with proper password access:

1. Create, delete or modify control strategies.
2. Add/delete objects to the system.
3. Tune control loops through the adjustment of control loop parameters.
4. Enable or disable control strategies.
5. Generate hard copy records or control strategies on a printer.
6. Select points to be alarmable and define the alarm state.
7. Select points to be trended over a period of time and initiate the recording of values automatically.

E. On-line Help: Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.

F. On-line Documentation: Provide a context sensitive, on-line documentation system to assist the operator in operation and trouble shooting of each integrated system. On-line help shall be available for all applications and shall provide the relevant data for that particular monitoring screen. As a minimum, provide a link to the Sequence of Operation, input/output summary, and cut sheets in either Adobe Acrobat™ or HTML format.

G. Security: Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

H. System Diagnostics: The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

I. Alarm Console

1. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.
2. When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

2.11 BROWSER USER INTERFACE SOFTWARE (EXISTING)

A. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.

B. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the EMCS, shall not be acceptable.

C. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Full User Interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.

D. The Web browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
2. Graphical screens developed for the FUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the FUI shall be supported by the Web browser interface.

3. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
4. Storage of the graphical screens shall be in the Network Area Controller (NAC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
5. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.
6. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
   a. Modify common application objects, such as schedules, calendars, and set points in a graphical manner.
      - Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
      - Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
   b. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
   c. View logs and charts
   d. View and acknowledge alarms
7. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to a pre-defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.
8. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.12 SYSTEM PROGRAMMING

A. The Full User Interface software (FUI) shall provide the ability to perform system programming and graphic display engineering as part of a complete software package. Access to the programming functions and features of the FUI shall be through password access as assigned by the system administrator.

B. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide "real-time" data updates. Any real-time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface display shall not be acceptable.

C. Programming Methods

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user's application. Objects shall be linked by a graphical linking scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects shall maintain their connections to other objects regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification. Links will vary in color depending on the type of link; i.e., internal, external, hardware, etc.
2. Configuration of each object will be done through the object's property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.

3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.
4. All programming shall be done in real-time. Systems requiring the uploading, editing, and downloading of database objects shall not be allowed.
5. The system shall support object duplication within a customer's database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

2.13 OBJECT LIBRARIES

A. A standard library of objects shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

B. The objects in this library shall be capable of being copied and pasted into the user's database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.

C. In addition to the standard libraries specified here, the supplier of the system shall maintain an on-line accessible (over the Internet) library, available to all registered users to provide new or updated objects and applications as they are developed.

D. The object library shall include objects to support the integration of devices connected to the Network Area Controller (NAC). At a minimum, provide the following as part of the standard library included with the programming software:

1. Lon Mark/Lon Works devices. These devices shall include, but not be limited to, devices for control of HVAC, lighting, access, and metering. Provide Lon Mark manufacturer-specific objects to facilitate simple integration of these devices. All network variables defined in the Lon Mark profile shall be supported. Information (type and function) regarding network variables not defined in the Lon Mark profile shall be provided by the device manufacturer.

2. For devices not conforming to the Lon Mark standard, provide a dynamic object that can be assigned to the device based on network variable information provided by the device manufacturer. Device manufacturer shall provide an XIF file and documentation for the device to facilitate device integration.

2.14 LONWORKS NETWORK MANAGEMENT

A. The Full User Interface software (FUI) shall provide a complete set of integrated Lon Works network management tools for working with Lon Works networks. These tools shall manage a database for all Lon Works devices by type and revision, and shall provide a software mechanism for identifying each device on the network. These tools shall also be capable of defining network data connections between Lon Works devices, known as "binding". Systems requiring the use of third party Lon Works network management tools shall not be accepted.

B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device maintenance and network variable binding.

C. The Network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.

D. These tools shall provide the ability to "learn" an existing Lon Works network, regardless of what network management tool(s) were used to install the existing network, so that existing Lon Works devices and newly added devices are part of a single network management database.

E. The network management database shall be resident in the Network Area Controller (NAC), ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management databases that are not resident, at all times, and within the control system shall not be accepted.

2.15 OTHER CONTROL SYSTEM HARDWARE

A. Motorized Control Dampers: Coordinate with the other trades for the exact quantity, size and location of all dampers. Dampers shall be black enamel finish or galvanized, with nylon bearings. Blade edge and tip seals shall be included for all dampers. Blades shall be 16-gauge minimum and 6 inches wide maximum and frame shall be of welded channel iron. Dampers with both dimensions less than 18 inches may have strap iron frames. Ruskin CD-46 or Equal.

B. Control Damper and Valve Actuators: Coordinate with other trades for exact quantity, size and location of all dampers. Provide all dampers unless Two-position or proportional electric actuators shall be direct-mount type. All actuators shall be spring return type. Provide one actuator per damper minimum.

C. Control Valves: Control valves shall be 2-way or 3-way pattern as shown constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Valves with sizes up to and including 2 inches shall be "screwed" configuration and 2-1/2 inch and larger valves shall be "flanged" configuration. Electrically controlled valves shall include spring return type actuators sized for tight shut-off against system pressures and furnished with integral switches for indication of valve position (open-closed). Three-way butterfly valves, when utilized, shall include a separate actuator for each butterfly segment.

D. Wall Mount Room Thermostats: Each room thermostat shall provide temperature indication to the digital controller; provide the capability for a software-limited set point adjustment and operation override capability. An integral LCD shall annunciate current room temperature and set point as well as override status indication. In addition, the thermostat shall include a port for connection of the portable operator's terminal described elsewhere in this specification.

E. Duct Mount, Pipe Mount and Outside Air Temperature Sensors: 10,000-ohm thermistor temperature sensors with an accuracy of ± 0.2ºC. Outside air sensors shall include an integral sun shield.

F. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.

G. Water Flow Meters (when required): Water flow meters shall be axial turbine style flow meters which translate liquid motion into electronic output signals proportional to the flow sensed. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag. Flow meters shall be 'insertion' type complete with 'hot-tap' isolation valves to enable sensor removal without water supply system shutdown. Accuracy shall be ±2% of actual reading from 0.4 to 20 feet per second flow velocities.

H. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. Control panels shall meet all requirements of Title 24, California Administrative Code. All electrical devices within a control panel shall be factory wired. All external wiring shall be connected to terminal strips mounted within the panel. Provide engraved phenolic nameplates identifying all devices mounted on the face of control panels. A complete set of 'as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel.

2.16 INPUT DEVICES

A. System accuracy of sensed conditions shall be as follows:

1. +/- .5°F for space temperature in the 0-130°F range
2. +/- .5°F for duct temperatures in the 40-130°F range
3. +/- 1.0°F for outside air temperatures in the (-30)-230°F range
4. +/- 1.0°F for water temperatures in the 30-230°F range
5. +/- .1 inch for filter status differential over a 0-2 inch range

B. The system shall maintain the specified analog end-to-end accuracy throughout the warranty period from sensor to controller readout.

C. Packaging: Sensors (transducers) will be appropriately packaged for the location.

1. Architectural housing for space mounting.
2. Weatherproof/sunshield housing for outdoors.
3. Thermal well housing for water applications.
4. Protective housing for duct mounting.

D. Environmental Ratings - The sensor/transducer shall be selected to withstand ambient conditions where:

1. Moisture or condensation is a factor.
2. Vibration exists from ductwork, equipment, etc.
3. Reasonably expected transient conditions exist for temperatures, pressures, humidities, etc. outside the normal sensing range.

E. Temperature Sensors

1. Temperature sensors will be by the use of thermistors (10K ohm at 77°F) or RTDs (PT100 curve).
2. Sensors in the return or discharge duct shall be of the single point type. Sensors in the mixed air will be of the average type.
3. Thermowells shall be brass or stainless steel for non-corrosive fluids below 250°F and 300 series stainless steel for all other applications.
4. Room temperature sensors: Sensing element only.

F. Digital Sensors

1. All digital inputs will be provided by dry contacts. The contacts will be wired normally open or normally closed as required.
2. Motor status (pumps, fans, etc.) shall be determined by current-operated switch.

2.17 OUTPUT DEVICES

A. The use of multiplexers will not be accepted.

B. Relays and Contactors

1. All digital outputs will be electrically isolated from the digital controller by interface relays.
2. Field relays shall have a minimum life of 1 million cycles without failure.
3. Contactors shall have a minimum life of ten thousand cycles without failure.

2.18 ACTUATORS

A. Standard manufacturer damper and valve actuators, proportional or two-position as required, sized to properly operate device. Damper actuators shall be of the direct coupled type, Belimo or equal.

2.19 WIRING AND CONDUIT

A. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.

B. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Set screw fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.

C. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.

D. Junction boxes shall be provided at all cable splices, equipment terminations, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.

E. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire alarm system shall be in conduit.

2.20 ENCLOSURES

A. All controllers and field interface panels shall be mounted in new enclosures unless otherwise stated in this specification.

B. All outside mounted enclosures shall meet the NEMA-4 rating.

C. Wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

2.21 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class indicated. Where type or body material is not indicated, make selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system.

B. Globe Pattern: As follows:

1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity re-packable under pressure.

2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.

3. Hydronic Systems: As follows:

   a. Rating: Service at 125 psi WSP and 250°F.
   b. Internal Construction: Replaceable plugs and seats of stainless steel or brass.
      - Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
      - Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
   c. Sizing: 3-psi maximum pressure drop at design flow rate.
   d. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics. Select operators to close valves against pump shutoff head.

C. Terminal Unit Control Valves: Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.

1. Rating: Service at 125 psi WSP and 250°F.

2. Sizing: 3-psi maximum pressure drop at design flow rate, to close against pump shutoff head.

3. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics.

4. Operators (2 Position): Synchronous motor with enclosed gear train, dual-return springs, valve-position indicator. Valves spring return to normal position for temperature protection.

5. Operators (Modulating): Self-contained, linear motor, actuator with 60-second full travel, with transformer and single-throw, double-pole contacts.

2.22 DAMPERS

A. Dampers: AMCA-rated, parallel or opposed blade design; form frames from not less than 0.1084-inch galvanized steel with mounting holes for duct mounting; damper blades not less than 0.0635-inch galvanized steel, with maximum blade width of 8 inches.

1. Blades secured to 1/2-inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass. Ends sealed against spring-stainless-steel blade bearings. Thrust bearings at each end of every blade.

2. Operating Temperature Range: From -40 to 200°F.

3. For standard applications as indicated, (as selected by manufacturer's sizing techniques) with optional closed-cell neoprene edging.

4. Provide low-leakage parallel or opposed blade design (as selected by manufacturer's sizing techniques) with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm/sq.ft. of damper area, at differential pressure of 4 inches wg when damper is being held by torque of 50 inch-pounds; test in accordance with AMCA 500. Ruskin CD-46 or equal.

2.23 ACTUATORS

A. Electronic Actuators: The actuator shall be direct coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The actuator shall have electronic overload circuitry to prevent damage. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing. Non-spring return actuators shall have an external manual gear release to allow positioning of the damper when the actuator is not powered.

B. All valves shall be fully proportioning, unless otherwise specified, quiet in operation, and shall be arranged to fail safe, in either a normally open or normally closed position, in the event of power failure. The open of closed position shall be as specified or as required to suit job conditions. All valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controller and variable load requirements.

C. Where valves operate in sequence with other valves or damper operators, provide on each valve a pilot positioner to provide adjustable operating ranges and starting points and positive close off at the required control signal pressure. Positioners must be directly connected to the valve stem. Ratio relays are not acceptable.

D. Valves shall be sized by the Temperature Control Manufacturer and guaranteed to meet the heating or requirements as specified and indicated on the Drawings. Unless otherwise specified, all shall conform to the requirements herein specified for the piping system in which they are installed.

2.24 CENTRAL CONTROL PANEL

A. Integrate new controls into existing central control touch screen panel. This central panel will allow for time clock scheduling, setpoints, monitoring of points and alarm. All freezestats will be reset manually at the central panel. All alarms will be displayed and reset manually at central panel.

B. All exhaust fans shall be controlled by the central control panel.

C. Central control panel shall be connected to existing District IT Network. District shall provide data drop.

2.25 AUXILIARY EQUIPMENT/DEVICES

A. Analog Sensors

1. Duct sensors (greater than four square feet): Monitoring range to suit application. Platinum or nickel wound RTD Type + 0.1% of range. Factory calibration point – 70 Deg. F at 1000 OHMS.

2. Space Temperature Sensors: Space Temperature Sensors shall be 5,000 or 10,000 ohm thermistor with wall plate adapter and blank cover assembly. The sensor shall include an integral occupancy override button and shall also include a RJ11 communications port. Space Temperature Sensors shall include space temperature adjustment slides where shown on the plans. The Space Temperature Sensors shall be mounted approximately 60” above the floor.

3. Hydronic Well Temperature Sensors: Water Temperature Sensors shall be well mounted 5,000 or 10,000 ohm thermistors.

4. Status Indication- Status indication for fans and pumps shall be provided by a current sensing sensor. The sensor shall be installed at the motor starter or motor to provide load indication. The unit shall consist of a current transformer, a solid state current sensing circuit (with adjustable set point) and a solid state switch. A red light emitting diode (LED) shall indicate the on off status of the unit. The switch shall provide a N.O. contact for wiring back to the Field Installed Controller.

5. Combination CO2 and Space Temperature Sensors: CO2 and space sensors are comprised of two sensors housed in one unit designed to measure both CO2 in the air and the building air temperature. Combination sensor shall have the following features:
   a. Self Calibration CO_2 sensor with 5 year calibration interval.
   b. Push button over ride.
   c. CO_2 sensitivity +/- 20 ppm.
   d. CO_2 accuracy +/- 100 ppm.
   e. Space sensor: 5 or 10K thermistor.

2.26 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors

1. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of – 30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.

2. Standard space sensors shall be available in an off white enclosure for mounting on a standard electrical box.

3. Where manual overrides are required, the sensor housing shall feature both an optional sliding mechanism for adjusting the space temperature setpoint, as well as a push button for selecting after hours operation.

4. Where a local display is specified, the sensor shall incorporate either an LED or LCD display for viewing the space temperature, setpoint and other operator selectable parameters. Using built in buttons; operators shall be able to adjust setpoints directly from the sensor.

5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors are useable in air handling applications where the coil or duct area is less than 14 square feet.

6. Averaging sensors shall be employed in ducts, which are larger than 14 square feet. The averaging sensor tube must contain at least one thermistor for every 3 feet, with a minimum tube length of 12 feet.

7. Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250 degrees F. and 300 series stainless steel for all other applications.

8. A pneumatic signal shall not be allowed for sensing temperature.

B. Humidity Sensors

1. Humidity devices shall be accurate to +/- 5% at full scale for space and +/- 3% for duct and outside air applications. Suppliers shall be able to demonstrate that accuracy is NIST traceable.

2. Provide a hand held field calibration tool that both reads the output of the sensor and contains a reference sensor for ongoing calibration.

C. Pressure Sensors

1. Air pressure measurements in the range of 0 to 10” water column will be accurate to +/- 1% using a solid-state sensing element. Acceptable manufacturers include Modus Instruments and Mamac.

2. Differential pressure measurements of liquids or gases shall be accurate to =/- 0.5% of range. The housing shall be NEMA 4 rated.

D. Current and KW Sensors

1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in solid and split core models, and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris or approved equal.

2. Measurement of three-phase power shall be accomplished with a kW/kWH transducer. This device shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed output proportional to the energy usage (kWH). Provide Veris Model 6000 Power Transducer or approved equal.

E. Flow Sensors

1. Provide an insertion vortex flow meter for measurement of liquid or gas flows in pipe sizes above 3 inches.
2. Install the flow meter on an isolation valve to permit removal without process shutdown.
3. Sensors shall be manufactured by EMCO or approved equal.

F. Carbon Dioxide Sensors

1. Non-Dispersive Infrared (NDIR), 0-2000 PPM.
2. Power Requirement, 18-30 VDC.
3. Voltage output, 0-10- VDC Full Scale.
4. Current output, 4-20 mA

2.27 AIRFLOW MEASURING STATIONS

A. Provide a thermal anemometer using instrument grade self heated thermistor sensors with thermistor temperature sensors. The flow station shall operate over a range of 0 to 5,000 feet/min with an accuracy of +/- 2% over 500 feet/min and +/- 10 ft/min for reading less than 500 feet/min.

B. The output signal shall be linear with field selectable ranges including 0-5 VDC, 0-10VDC and 4-20 mA.

C. Furnish Ebtron Series 3000 airflow stations or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. All DDC Controllers shall be networked to Central Communications controller.

B. Existing Front End Workstation in B & G office shall be configured for High School Addition access. Text/Graphic screens for each system shall match existing.

C. Communications cabling shall be run in hallways above hung ceiling with plenum cable and wiremold where exposed.

3.2 CONTRACTOR RESPONSIBILITIES

A. General: The Contractor or a Sub-Contractor shall perform installation of the building automation system. However, all installations shall be under the personal supervision of the Contractor. The Contractor shall certify all work as proper and complete.

B. Demolition: Remove controls, which do not remain as part of the building automation system, all associated abandoned wiring and conduit and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment, which is to be removed, that will remain the property of the Owner. The Contractor will dispose of all other equipment that is removed.

C. Access to Site: Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner's representative.

D. Code Compliance: All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations. Should any discrepancy be found between wiring Specifications in Division 26 and Division 22, wiring requirements of Division 26 will prevail for work specified in Division 26.

E. Cleanup: At the completion of the work, all equipment pertinent to this Contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this Contract. Clean the exposed surfaces of tubing, hangers, and other exposed metal of grease, plaster, or other foreign materials.

3.3 WIRING, CONDUIT, TUBING AND CABLE

A. All wire will be copper and meet the minimum wire size and insulation class listed below:

Wire Class	Wire Size	Isolation Class
Power	12 Gauge	600 Volt
Class One	14 Gauge Std.	600 Volt
Class Two	18 Gauge Std.	300 Volt
Class Three	18 Gauge Std.	300 volt
Communications	Per Mfr.	Per Mfr.

B. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.

C. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.

D. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Setscrew fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.

E. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.

F. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasket covers.

G. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire management system shall be in conduit.

H. Coaxial cable shall conform to RG62 or RG59 rating. Provide plenum rated coaxial cable when running in return air plenums.

3.4 HARDWARE INSTALLATION

A. Installation Practices for Wiring and Tubing

1. All controllers are to be mounted vertically and per the manufacturer's installation documentation.
2. The 120 VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. This circuit will not feed any other circuit or device.
3. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.
4. Wires are to be attached to the building proper at regular intervals such that wiring does not drop. Wires are not to be affixed to or supported by pipes, conduit, etc.
5. Wiring in finished areas will be concealed in ceiling cavity spaces, plenums, and furred spaces and wall construction. Exception; metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.
6. Wiring, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.
7. Wires are to be kept a minimum of three (3) inches from hot water or condense piping.
8. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.

B. Installation Practices for Field Devices

1. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.
2. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.
3. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.
4. Water line mounted sensors shall be removable without shutting down the system in which they are installed.
5. For duct static pressure sensors, the high-pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low-pressure port shall be left open to the plenum area at the point that the high-pressure port is tapped into the ductwork.
6. For building static pressure sensors, the high-pressure port shall be inserted into the space via a metal tube. Pipe the low-pressure port to the outside of the building.

C. Enclosures

1. For all I/O requiring field interface devices, these devices, where practical, will be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure, which protects the device(s) from dust, moisture, conceals integral wiring and moving parts.
2. FIP's shall contain power supplies for sensors, interface relays and Contractors, safety circuits, and I/P transducers.
3. The FIP enclosure shall be of steel construction with baked enamel finish; NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for 20% spare mounting space. All locks will be keyed identically.
4. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.
5. All outside mounted enclosures shall meet the NEMA-4 rating.
6. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

D. Identification

1. Identify all control wires with labeling tape or sleeves using either words, letters, or numbers that can be exactly cross-referenced with As-Built Drawings.

2. All field enclosures, other than controllers, shall be identified with a Bakelite nameplate. The lettering shall be in white against a black or blue background.

3. Junction box covers will be marked to indicate that they are a part of the BAS system.

4. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with nameplates.

5. All I/O field devices inside FIP's shall be labeled.

E. Control System Switch-Over

1. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.

2. Switch over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch over.

3. The Contractor shall minimize control system downtime during switch over. Sufficient installation mechanics will be on site so that the entire switch over can be accomplished in a reasonable time frame.

F. Location

1. The location of sensors is per Mechanical and Architectural Drawings.
2. Outdoor air sensors will be mounted on the north building face directly in the outside air. Install these sensors such that the effects of heat radiated from the building or sunlight is minimized.
3. Field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.

3.5 SOFTWARE INSTALLATION

A. General: The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software or other third party software necessary for successful operation of the system.

B. Database Configuration: The Contractor will provide all labor to configure those portions of the database that are required by the points list and sequence of operation.

C. Color Graphic Slides: Unless otherwise directed by the Owner, the Contractor will provide color graphic displays as depicted in the Mechanical Drawings for each system and floor plan. For each system or floor plan, the display shall contain the associated points identified in the point list and allow for set point changes as required by the Owner.

D. Reports - The Contractor will configure a minimum of 6 reports for the Owner as listed below:

1. Central Plant Status Report
2. Air Handler Status Report
3. Energy Consumption Report

4. Space Temperature Report
5. Specialty Equipment Status Report

E. Documentation - As-Built software documentation will include the following:

1. Descriptive point lists
2. Application program listing
3. Application programs with comments
4. Printouts of all reports
5. Alarm list
6. Printouts of all graphics

3.6 COMMISSIONING AND SYSTEM STARTUP

A. Point-to-Point Checkout: Each I/O device (both field mounted as well as those located in FIP's) shall be inspected and verified for proper installation and functionality. A checkout sheet itemizing each device shall be filled out, dated and approved by the Project Manager for submission to the Owner or Owner's representative.

B. Controller and Workstation Checkout: A field checkout of all controllers and miscellaneous equipment shall be conducted to verify proper operation of both hardware and software. A checkout sheet itemizing each device and a description of the associated tests shall be prepared and submitted to the Owner or Owner's representative by the completion of the project.

C. System Acceptance Testing

1. All application software will be verified and compared against the sequences of operation. Control loops will be exercised by inducing a setpoint shift of at least 10% and observing whether the system successfully returns the process variable to setpoint. Record all test results and attach to the Test Results Sheet.

2. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the Owner.

3. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the Owner.

4. Perform an operational test of each third party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

3.7 SEQUENCES OF OPERATION

A. VRF Ductless Split Ceiling and Ducted Units

1. Point List

a. Space Temperature
b. Occupied/Unoccupied

2. Sequence of Operation

a. Unoccupied Mode: Cooling shall not operate.

b. Occupied Mode: Heating or cooling shall operate as required based upon its own packaged controls and factory thermostat to maintain thermostat setpoint. Baseboard radiation shall operate as Stage 1 heating. Heating heat pump operation shall operate as Stage 2 to maintain space thermostat setpoint. Heat recovery mode shall operate as required, providing heating or cooling as required. Unoccupied/Occupied scheduling will be via BMS.

B. Packaged Rooftop Ventilation / Energy Recovery Units (HVAC-1, 3, 4)

1. Point List

a. Supply Fan VFD (Speed and Status)
b. Exhaust Fan VFD (Speed and Status)
c. Energy Recovery Wheel VFD (Speed and Status)
d. Discharge Air Temperature Setpoint(s)
e. OA, EA Temperatures
f. Heating Coil Valve(s) Modulation (Remote)
g. OA, EA Damper Modulation
h. Return Air Damper Position
i. Freeze-stat
j. DX Cooling Start/Stop/Status
k. Dirty Filter Status
l. Relative Humidity (Supply Air)

2. Sequence of Operation

a. Unoccupied: In this mode:
Supply and Exhaust fans off, OA and EA dampers closed. If the respective unoccupied average space temperature is not maintained by the respective baseboard radiation or VRF units, the respective rooftop ventilation unit shall cycle on in the recirculation mode (return air damper open). The respective heating coil valve shall modulate to satisfy the space heating setpoint. Upon satisfaction, the rooftop unit shall stop until the next cycle, if required.

b. Occupied: The OA and EA dampers will open

- Supply fan will start and ramp up slowly to its' preset speed via VFD. The return fan will follow and track the supply fan as needed.
- Perimeter Radiation Valves will be the first stage of heating and open as needed to maintain the space temperature setpoint (adj.). Should additional heating be required the VRF Ductless cassettes shall operate in heat pump mode to maintain the heating setpoint.

- Direct expansion cooling system shall operate as needed to maintain occupied cooling setpoint (adjustable). Hot gas reheat shall maintain relative humidity in discharge air to 60 % RH (adjustable).
- Hot water valve will modulate as needed to maintain discharge air heating setpoint (adjustable). Hot water control valve shall be closed during economizer operation.
- An adjustable dead band offset will prevent short cycling.
- Note: the energy recovery wheel will be on when the unit is on and rotate as needed to maintain exhaust air temperature. Energy wheel freeze protection is integral to the unit.
- Minimum outdoor air shall be as scheduled on drawings.

c. Alarms: In this mode:

- The freezestat mounted after the hot water coil will protect the coils from freezing. Should the freezestat go into alarm the supply and return fans will shut off. The OA and EF, dampers will be closed. The RA damper shall be open. The hot water coil valve will be open. An alarm will be generated at the operators work station. Note: The freezestat will be able to be reset from the operator's work station.
- Should the command not equal the status within 90 seconds from start-up an alarm will be generated at the operator's work station.
- Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.

d. Economizer - In this mode:

- If the outside air temperature is greater than the return air temperature, the system will operate as described in the occupied mode. Unit shall operate according to its own packaged controls to control the wheel operation and speed when outdoor conditions are favorable.
- If the outside air temperature is less that the return air temperature and the outside air temperature is greater than 50 Degrees F. (adjustable), the ERU heat transfer wheel rotation shall stop.

C. Fin-Tube Radiation, Convectors

1. Point List

a. Space Temperature
b. Valve Modulation

2. Sequence of Operation

a. Unoccupied Mode (Heating Season): Modulate control valve to maintain night setback temperature set-point (adjustable).

b. Occupied Mode (Heating Season): Modulate control valve to maintain daytime temperature set-point (adjustable).

D. Cabinet Heaters

1. Point List

a. Space Temperature

b. Valve Modulation
c. Fan Start/Stop

2. Sequence of Operation

a. Unoccupied Mode (Heating Season): Modulate heating control valve to maintain night setback temperature set-point (adjustable). Fan shall not run if hot water is not enabled and available.

b. Occupied Mode (Heating Season): Modulate heating control valve to maintain occupied temperature set-point (adjustable). Fan shall not run if hot water is not enabled and available.

E. Exhaust Fans (EF-1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13)

1. Point List

a. Fans Start/Stop
b. Fans Status

2. Sequence of Operation

a. Unoccupied Mode: Fans Off, Dampers Closed.

b. Occupied Mode: Fans On, Dampers Open.

c. Alarms generated at operator's workstation: Exhaust Fan Status.

F. Exhaust Fans (EF-9, EF-16)

1. Point List

a. Fans Start/Stop
b. Fans Status

2. Sequence of Operation

a. Unoccupied Mode: Fan enabled, Dampers Closed.
Fan shall be energized by a local manual switch.

b. Occupied Mode: Fan enabled, Dampers Open -
Fan shall be energized by a local manual switch. EF-16 shall be interlocked with makeup air damper.

G. Exhaust Fans (EF-14, EF-15)

1. Point List

a. Fans Start/Stop
b. Fans Status

2. Sequence of Operation

a. Unoccupied Mode: Fan Off, Dampers Closed.

b. Occupied Mode: Fan Enabled, Dampers Open.
Fan interlocked with respective unit ventilator UV-A or UV-B. Fan only runs when unit ventilator runs.

H. Exhaust Fans (EF-11)

1. Point List

a. Fans Start/Stop
b. Fans Status

2. Sequence of Operation

a. Unoccupied Mode: Fan Off, Dampers Closed.

b. Occupied Mode: Fan Enabled, Dampers Open.
Fan interlocked with respective lighting occupancy sensor.

I. Exhaust Fan (EF-17)

1. Point List

a. Fan Start/Stop
b. Fan Status

2. Sequence of Operation

a. Unoccupied Mode: Fans Off, Dampers Closed.

b. Occupied Mode: Fans enabled On, Dampers Open.

c. Fan shall be interlocked with the clothes dryer operation. Whenever the dryer runs, the fan shall start and run.

J. Cooling coils / Air Conditioners / Condensing Units

1. Point List

a. System Enabled/Disabled
b. System Status
c. Space Temperature

2. Sequence of Operation

a. Unoccupied Mode: System Disabled. (IT cooling units shall be enabled at all times)

b. Occupied Mode: System Enabled.

c. System shall operate in accordance with its own packaged controls.

d. Alarms generated at operators workstation: Space temp out of Bounds +/- 5 F.

K. Indoor Energy Recovery Units (ERU-1, 2, 3, 4)

1. Point List

a. Supply Fan Status
b. Exhaust Fan Status
c. OA, EA, Air Temperatures
d. OA, EA, Damper
e. Discharge Temperature
f. Heating Coil Valve
g. D/X Cooling (ERU-1 Only)
h. Energy Recovery Wheel VFD Speed Status (ERU-1, 2 only)
i. Dirty Filter Status

2. Sequence of Operation

a. Unoccupied - In this mode:
Supply and Exhaust fans off, OA and EA dampers closed, VRF Console Unit heat shall be Stage 1. If additional heat is required, the respective energy recovery unit shall start and run to maintain the night setback temperature (60°F). The hot water coil control valve shall modulate as required.

b. Occupied - In this mode:
- The OA and EA dampers will open and thru a hard wired interlock the Supply and Exhaust fans will start.
- Energy transfer will be both sensible and latent energy between air steams. Latent energy transfer media transfer will be accomplished by direct water vapor transfer from one air steam to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.
- This hot water coil control valve shall modulate as required to maintain occupied heating discharge setpoint (72˚F adjustable) as sensed by the duct discharge temperature sensor. Hot water control valve shall be closed during economizer operation.
- An adjustable dead band offset will prevent short cycling.
- In cooling mode, (applicable to ERU-1) the respective condensing unit shall vary its capacity as required to maintain occupied cooling discharge setpoint (72˚adjustable) as sensed by the duct discharge sensor.

c. Alarms: In this mode:
- The freezestat mounted after the hot water coil will protect the coils from freezing. Should the freezestat go into alarm the supply and return fans will shut off. The OA and EF, dampers will be closed. The RA damper shall be open (ERU-1, 2 only). The hot water coil valve will be open. An alarm will be generated at the operators work station. Note: The freezestat will be able to be reset from the operator's work station.
- Should the command not equal the status within 90 seconds from start-up an alarm will be generated at the operator's work station.
- Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.

d. Economizer - In this mode:
- If the outside air temperature is greater than the return air temperature, the system will operate as described in the occupied mode.

- If the outside air temperature is less that the return air temperature and the outside air temperature is greater than 50 Degrees F. (adjustable), the ERU heat transfer wheel shall stop (ERU-1, 2 only) and mechanical cooling shall stop.

L. Hot Water Heating Pumps (HWP-1 & HWP-2)

1. Point List
   a. Pump Start/Stop
   b. Pump Status
   c. VFD Status

2. Sequence of Operation

   a. Occupied Mode: Pump HWP-1 or HWP-2 shall start when the outdoor air temperature drops below 60 º F. (adjustable).

   b. Unoccupied Mode: Pump HWP-1 or HWP-2 shall start when the outdoor air temperature drops below 40 º F. (adjustable).

   c. Lead / Lag: When the system calls for heat, the lead pump shall start, if the pump current sensor, does not sense proper current within 4 minutes, the lead pump shall shutdown and the lag pump shall become lead and an alarm shall be generated at the OWS. Pumps shall alternate once each seven days to provide equal run time.

   d. Pump speed shall modulate through the respective VFD as required to satisfy the system pressure control sensor.

M. Unit Ventilators (UV-A, UV- B, UV-C)

1. Point List
   a. Space Temperature
   b. Space Temperature Setpoint
   c. Discharge Air Temperature
   d. Freeze-stat Status
   e. Fan Start/Stop
   f. OA/RA Damper Modulation
   g. Face and Bypass Damper Modulation
   h. End of Cycle Valve Open/Close
   i. Baseboard Radiation Control Valve Modulation

2. Sequence of Operation

   a. Unoccupied Mode: The end of cycle valve shall be open, outside air damper shall be closed, the return damper shall be open and the F&B damper shall be in full face position. The radiation valve (if applicable) shall modulate to maintain night setback setpoint. Should the radiation alone fail to maintain the setpoint, the unit fan shall be energized. Should setpoint be exceeded F&B damper shall modulate to by-pass position.

   b. Occupied Mode (Heating): Unit fan shall run continuously. During morning warm-up mode (room temperature more than 2 degrees below daytime setpoint), outside air damper shall be closed. As room temperature rises, outside air damper shall modulate to minimum position. **Note: Morning warm-up shall be scheduled to occur prior to space occupancy.** Should room temperature continue to rise past setpoint, radiation valve (if applicable) shall modulate closed, F&B damper shall modulate to full bypass, end of cycle valve shall close and then outside air damper shall modulate further open to provide free cooling (based on differential enthalpy). As room temperature decreases the

reverse shall occur. A freezestat shall stop fan, close outside air damper, place F&B damper in full bypass position and open the end of cycle valve.

- Perimeter radiation will be off (if applicable).

c. Economizer Mode: In cooling mode:

If the outside air temperature is greater than the return air temperature, the system will operate as described in the occupied mode.

- If the outside temperature is greater than the return air temperature, the system will operate as described in the occupied mode.

- If the outside temperature is less than the return air temperature and the outside air temperature is greater than 50°F (adjustable), the OA damper will open and the return air damper will close. This will be the Cooling Mode.

d. Alarms: In all modes:

- Should the command not equal the status within 90 seconds from start-up, an alarm will be generated at the operator's work station.

- Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.

N. Three-Way Mixing Valve (Coils)

1. Point List

a. HWS Temperature.
b. HWR Temperature.
c. HW Mixed Temperature.
d. Valve Modulation.
e. Freeze-Stat Status.

2. Sequence of Operation:
The three-way control valve will modulate through the DDC system to modulate the hot water supply to satisfy low limit and room temperature setpoints.

3. Alarms: In all modes:

Should the command not equal the status within 90 seconds from start-up, an alarm will be generated at the operator's work station.

Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.

A freezestat located on the discharge side pf the coil shall open the valve, stop the associated air handler, and an alarm shall be generated at the operator's work station.

O. Space Temperature Setpoints

1. Heating mode

a. Occupied: Temperature setpoint shall be maximum 72 degrees F.

b. Unoccupied: Temperature setpoint shall be minimum 55 degrees F.

2. Cooling mode

a. Occupied: Temperature setpoint shall be minimum 78 degrees F.

b. Unoccupied: Temperature setpoint shall be maximum 85 degrees F.

P. Packaged Gas-Fired Rooftop HVAC Units (RTU-1, 2, 3, 4)

1. Point List

a. Space Temperature.
b. Discharge Air Temperature.
c. Fans Start/Stop.
d. Occupied/Unoccupied.
e. Gas Valve Modulation.
f. Supply Fan VFD Status.
g. Filter Dirty.
h. D/X Cooling Status (each circuit).
i. OA, RA damper Position.

2. Sequence of Operation

a. Unoccupied: In this mode - Supply fan off, OA dampers closed. Upon a call for heat at the setback temperature, the fan shall start and run, the OA damper closed, RA damper open. Unit shall operate in the heating mode until the setback temperature is satisfied, and upon satisfaction, unit fan shall stop.

b. Occupied: The OA dampers will open.

- Supply fan will start and ramp up slowly to its' preset speed via VFD.
- Direct expansion cooling system shall operate as needed to maintain occupied cooling setpoint (adjustable).
- Gas heating will modulate as needed to maintain occupied heating setpoint (adjustable). Thermostat sensors shown shall average and control all four rooftop units.
- An adjustable dead band offset will prevent short cycling.

c. Economizer Mode: In this mode:

- If the outside air temperature is greater than the room air temperature, the system will operate as described in the occupied mode.
- If the outside air temperature is less than the room air temperature and the outside air temperature is greater than 50°F (adjustable), the OA will be the first stage of Cooling.
- Should additional cooling be required, the mechanical D/X cooling will modulate as needed.

d. Alarms: In this mode:

- Should the command not equal the status within 90 seconds from start-up, an alarm will be generated.
- Should any temperature fall outside of its preset limits (high/low) an alarm will be generated.

e. Ventilation Control:

- Outdoor air ventilation shall be controlled by carbon dioxide sensors. Ventilation rate shall vary from minimum 480 cfm to maximum 2,400 cfm for each rooftop unit, with a total minimum 1920 cfm to maximum 9,600 cfm at full occupancy of 975 people. The four sensors shall average CO and control OA of all four rooftop units.

f. Demand Control Ventilation (typical for all four rooftop units serving the space):

- Ventilation method shall be by demand controls. There shall be no provision to remove CO2 by any other method other than dilution. Prior to space occupancy, a pre-occupancy purge cycle shall be initiated for a minimum 30 minutes. For this purge, fan shall start and run and the outdoor air intake rate shall ramp up to 100 percent of design outdoor air (2,400 cfm). During occupancy, the outdoor air supply shall start to increase beyond the minimum ventilation setpoint (480 cfm), starting at an interior CO2 concentration of not greater than 100 PPM over that of the outdoor air concentration. The outdoor air supply shall continue to ramp up for full occupancy as CO2 concentrations rise to the upper limit of 1400 PPM over that of the outdoor air. Upon conclusion of occupancy, a post occupancy flush cycle shall occur. The fan shall run and the outdoor air intake rate shall ramp up to 100 percent of design outdoor air (2,400 cfm) until indoor CO2 concentrations in the space are reduced to outdoor air levels. After the post occupancy flush cycle has completed, the rooftop unit shall revert to minimum outdoor air ventilation setpoint (480 cfm). This minimum setpoint shall be satisfied whenever the system is in operation. The relief exhaust fan speed shall follow the outdoor air intake rate under all occupancies and conditions to maintain proper relief air. The economizer system shall override the CO2 control system when conditions permit free cooling of the space.

Q. Fan Coil Units

1. Point List

a. Space Temperature.
a. Space Temperature Setpoint.
b. Discharge Temperature.
c. Freezestat Status.
d. Supply Fan Start/Stop.
e. Supply Fan Status.
f. HW Coil Valve Modulation.

2. Sequence of Operation

b. Unoccupied Mode: The outside air damper shall be closed The unit fan shall be energized to maintain the setback setpoint.

c. Occupied Mode: Unit supply fan shall run continuously. During morning warm-up mode (room temperature more than 2 degrees below daytime setpoint), outside air damper shall be closed. Should room temperature rise past setpoint, hot water valve shall modulate closed and then OA damper shall move further to provide cooling (based on differential enthalpy calculation). A manual freezestat located on the discharge side of the hot water coil shall stop fan, and close outside air damper. An alarm shall be generated at the operator's work station. Fan shall not run if hot water heat is not enabled or available.

R. Steam to Hot Water Converter

1. Converter will be optimized on when outside air temperature is below 60 degrees F. (adjustable) and average room temperature is below 50 degrees F. (adjustable). adjustable). Whenever outside air is below 60 degrees F., and steam is available, converter will sequence on to maintain desired water temperature.

2. Converter monitoring and alarming will be done at the OWS. Converter steam control valves will modulate to schedule the hot water supply temperature through the outside air sensor.

The Converter shall maintain the following reset schedule:

Outside Air Temperature (°F.)	Hot Water Supply Temperature (°F.)
60	100
50	110
40	120
30	130
20	140
10	150
0	160

S. Unit Heaters

1. Point List

a. Space Temperature
b. Fan Start/Stop

2. Sequence of Operation

a. Unoccupied Mode (Heating Season): Fan shall cycle to maintain night setback temperature set-point (adjustable).

b. Occupied Mode (Heating Season): Fan shall cycle to maintain occupied temperature set-point (adjustable).

T. Electric Heaters

1. Point List

a. Space Temperature
b. Fan Start/Stop

2. Sequence of Operation

a. Unoccupied Mode (Heating Season): Fan shall cycle and heater shall be energized to maintain night setback temperature set-point (adjustable).

b. Occupied Mode (Heating Season): Fan shall cycle and heater shall be energized to maintain occupied temperature set-point (adjustable).

U. Dehumidifier/Humidifier

1. Point List

a. Space Temperature
b. Space Relative Humidity

2. Sequence of Operation

a. Unoccupied Mode: Unit shall operate according to its own packaged controls to maintain RH set-point (adjustable).

b. Occupied Mode: Unit shall operate according to its own packaged controls to maintain RH set-point (adjustable).

V. Supply Air Fan (SF-1)

1. Point List

a. Fan Start/Stop
b. Fan Status

2. Sequence of Operation

a. Unoccupied or Occupied Mode – Fire Pump not operating: Fan Off, Dampers Closed.

b. Unoccupied or Occupied Mode – Fire Pump operating: Dampers shall open and fan shall start and run.

c. Fan shall be interlocked with the Fire Pump operation. If room temperature drops below 35 degree F, fan shall slow to one half normal speed. Fan operation failure shall initiate and alarm at the BMS workstation. Also, a local alarm shall sound outside the mechanical room.

W. Packaged Rooftop Ventilation / Energy Recovery Units (HVAC-2)

1. Point List

a. Supply Fan VFD (Speed and Status)
b. Discharge Air Temperature Setpoint(s)
c. OA Temperature
d. Heating Coil Valve(s) Modulation (remote)
e. OA Damper Modulation
f. DX Cooling Start/Stop/Status

2. Sequence of Operation

a. Unoccupied: In this mode:
Supply fan off, OA dampers closed. If the respective unoccupied average space temperature is not maintained by the respective baseboard radiation or VRF units, the rooftop ventilation unit shall cycle on. The respective heating coil valve shall modulate to satisfy the space heating setpoint. Upon satisfaction, the rooftop unit shall stop until the next cycle, if required.

b. Occupied: The OA dampers will open

- Supply fan will start and ramp up slowly to its' preset speed via VFD.
- Perimeter Radiation Valves will be the first stage of heating and open as needed to maintain the space temperature setpoint (adj.). Should additional heating be required the VRF Ductless cassettes shall operate in heat pump mode to maintain the heating setpoint.
- Direct expansion cooling system shall operate as needed to maintain occupied cooling setpoint (adjustable).
- Hot water valve will modulate as needed to maintain discharge air heating setpoint (adjustable).
- An adjustable dead band offset will prevent short cycling.
- Minimum outdoor air shall be as scheduled on drawings.

c. Alarms: In this mode:

- The freezestat mounted after the hot water coil will protect the coil from freezing. Should the freezestat go into alarm the supply and return fans will shut off. The OA dampers will be closed. The hot water coil valve will be open. An alarm will be generated at the operators work station. Note: The freezestat will be able to be reset from the operator's work station.
- Should the command not equal the status within 90 seconds from start-up an alarm will be generated at the operator's work station.
- Should any temperature fall outside of its preset limits (high/low) an alarm will be generated at the operator's work station.

e. Economizer - In this mode:

- If the outside air temperature is greater than the space air temperature, the system will operate as described in the occupied mode.
- If the outside air temperature is less that the space air temperature and the outside air temperature is greater than 50 Degrees F. (adjustable), the ERU mechanical cooling shall stop.

3.8 CONTROL DIAGRAMS

A. Complete new control diagrams showing type of apparatus, cycles of operation and details of all equipment must be submitted for checking and be approved before installation is started.

B. Submit three (3) preliminary copies of the control diagrams, sequence descriptions, and equipment shop drawings for checking and submit six (6) copies, complete for final approval.

C. At the completion of installation, control manufacturer shall furnish non-fading original; plastic laminated copies of all control diagrams as they apply to the particular instruments thereon. One complete set of non-fading plastic laminated diagrams shall be mounted on wall as directed.

3.9 CERTIFICATION

A. After completion of installation and after equipment has been placed on operation, the temperature control manufacturer shall submit in writing, a complete and detailed report and certification that the entire installation is operating exactly as specified and shall be guaranteed for one year. Report shall state temperature and throttling range readings and settings of all control instruments. Submit to the Engineer preliminary for checking and approval.

3.10 INSTALLATION

A. All work under the automatic temperature control Sub-Contract shall be done by competent skilled mechanics regularly in the employ of the temperature control manufacturer.

B. Bidder must be a control manufacturer currently involved in the production of commercial pneumatic/electric temperature controls. Franchises and associations are not considered control manufacturers.

3.11 TRAINING

A. The Contractor shall supply personnel to train key customer personnel in the operation and maintenance of the installed system. The training program shall be designed to provide a comprehensive understanding and basic level of competence with the system. It shall be sufficiently detailed to allow customer personnel to operate the system independent of any outside assistance. On-line context sensitive HELP screens shall be incorporated into the system to further facilitate training and operation.

B. The training plan shall include detailed session outlines and related reference materials. The customer personnel shall be able to utilize these materials in the subsequent training of their co-workers.

1. Training time shall not be less than a total of 40 hours, and shall consist of:

   a. 16 hours during normal day shift periods for system operators. Specific schedules shall be established at the convenience of the customer.

   b. 24 hours of system training shall be provided to customer supervisory personnel so that they are familiar with system operation.

   c. The specified training schedule shall be coordinated with the customer and will follow the training outline submitted by the Contractor as part of the submittal process.

   d. Provide an as built Video training tape, showing and explaining all animated graphics in detail, all controllers and equipment the FMS operates (Four (4) Copies shall be supplied).

   e. If further training is needed, the Contractor shall provide another 40 hours at no extra cost.

2. All training sessions shall be scheduled by the Construction Manager. The Contractor shall provide sign-in sheets and distribute minutes of each session prior to the subsequent session. This documentation shall be included in the Operation and Maintenance manuals.

END OF SECTION

SECTION 23 0470

TESTING, START-UP AND ADJUSTMENTS

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 TESTING, START-UP AND ADJUSTMENTS

A. Furnish all materials, supplies, labor and power required for testing. Make preliminary tests and prove work satisfactory. Notify Architect and all authorities having jurisdiction in ample time to be present for final testing of all piping. Test before insulating or concealing any piping. Repair defects disclosed by tests, or if required by Architect, replace defective work with new work without additional cost to Owner. Make tests in stages if so ordered by Architect to facilitate work of others. Use of wicking in tightening leaking joints not permitted.

B. HVAC Contractor is responsible for work or other trades disturbed or damaged by tests and/or repair and replacement of his work, and shall cause work so disturbed or damaged to be restored to its original condition at his own expense.

C. Unless otherwise specified, all piping systems shall be hydrostatically tested to 150 psig. Tests shall be of four (4) hour duration during which time piping shall show no leaks and during time no sealing of leaks will be permitted.

D. HVAC Contractor shall balance out system and submit test reports showing operating data to include the following:

1. C.F.M. of all air handling equipment.

2. C.F.M. at each air outlet.

3. G.P.M. for equipment.

4. R.P.M. for each fan and fan motor.

5. Motor power consumption.

6. Air temperature readings before and after coils.

7. Water temperature readings in and out of coils and through equipment.

8. Pressure gauge readings before and out of all pertinent equipment.

E. HVAC Contractor shall furnish services of qualified personnel, thoroughly familiar with job, to operate and make all adjustments so that system and control equipment shall operate as intended. This shall include adjustment / replacement of sheaves/impellers to achieve design performance. Adjustments shall be made including balancing of water and air systems in cooperation with qualified representatives of mechanical equipment manufacturers and temperature control manufacturer. This shall include any required adjustment / replacement of sheaves, belts, impellers, etc. to achieve design performance. Architect / Engineer is to be notified when this balancing is to be performed.

F. Functional testing and system commissioning shall focus on key areas. Balancing of air and water flow rates in HVAC systems must meet requirements. Systems must be tested for functionality which includes installation, component operation and system to system interfacing. HVAC controls must be commissioned for proper calibration and operation in accordance with approved plans. Air economizers shall be tested to meet manufacturer's specifications. Comply with all requirements of the Energy Conservation Construction Code of New York State.

G. When all work is in an acceptable operating condition, furnish operating and maintenance manuals as specified in General Requirements.

H. All HVAC equipment shall be carefully designed, constructed and installed so as to prevent any objectionable noise or vibration reaching any part of the building outside of the mechanical equipment room. Care shall also be taken to prevent transmission of noise or odor through ductwork into other spaces.

I. Contractor shall include in his Bid, adjustment of air quantity below scheduled C.F.M. for air systems deemed "noisy" by Owner subsequent to initial balancing.

J. The Contractor shall be required to rectify of replace at his own expense, any equipment not complying with the foregoing requirements.

K. Final inspection and approval shall be made only after proper completion of all of above requirements.

L. If the performance of the systems does not conform to the design parameters the Contractor shall return to the site until the systems perform as designed.

END OF SECTION

SECTION 23 0480

GENERAL LABELING, VALVE CHARTS AND PIPING IDENTIFICATION

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 GENERAL LABELING AND VALVE CHARTS

A. This Contractor shall have appropriate descriptive labels, identification tags and nameplates of equipment, valves, etc. furnished and installed under this Contract and shall be properly placed and permanently secured to (or adjacent to) the item being installed. All such labels, identifications, tags, nameplates, etc. shall be selected by the Architect/Engineer.

B. In general, labels shall be the lamacoid type of sufficient size to permit easy identification, black coated, white edged, with letters 3/16" high. Major equipment, apparatus, control panels, etc. shall have 8" x 4" lamacoid plates with lettering of appropriate size.

C. Provide tags for all valves, automatic and manual dampers. Tags shall be Type #2020 anodized aluminum of #1420 lamacoid engraved. Tags may not necessarily be standard. Fasten tags to valve or damper with brass chain.

D. All nameplates, labels, identifications and tags shall be as manufactured by the Seton Name Plate Co., of New Haven, CT or approved equal. Submit complete schedules, listings and descriptive data together with samples for checking and approval before purchasing. Labeling shall include the "number" of the equipment, valve, dampers, switch, etc. and service of the valve.

E. Mount on laminated plastic boards with transparent surface all valves, wiring diagrams, control diagrams, instruction charts, permits, etc. Valve chart shall be non-fading with original copies laminated.

1.2 IDENTIFICATION OF PIPING

A. This Contractor shall provide on all piping, semi-rigid, wrap around plastic identification markers equal to Seton Snap-Around and/or Seton Strap-On pipe markers.

B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe. Directions of flow arrows are to be included on each marker.

C. Identification of all piping shall be adjacent to each valve, at each pipe passage through wall, floor and ceiling construction and at each branch and riser take-off.

D. Identification shall be on all horizontal pipe runs, marked every 15 ft. as well as at each inlet outlet of equipment.

E. Indoor gas piping shall be painted yellow, with appropriate markers. Outdoor piping shall be painted gray, per the utility.

END OF SECTION

SECTION 23 0485

HVAC SYSTEMS COMMISSIONING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 RELATED DOCUMENTS

A. Section 01 9100 – Commissioning Requirements, including drawings and general provisions of the Contract, including General and Supplementary Conditions, and other Division 01 Specification Sections.

B. In the case of a conflict between this and any other section in the project specifications, the more stringent or detailed requirements shall apply.

1.2 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

1.3 DESCRIPTION

A. The systems that shall be commissioned in this project include but are not limited to the following:

1. Central Building Automation System including packaged unitary controllers.

2. Equipment of the heating, ventilating and air conditioning systems.

1.4 OVERVIEW OF CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning inspections and tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing (TAB) review and coordination meetings.

D. Participate in HVAC systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

G. Provide detailed startup procedures.

H. Provide copies of all submittals, including all changes thereto, with details as required in the appropriate subsection of 3.1 Responsibilities.

I. Facilitate the coordination of the commissioning process and incorporate commissioning activities into overall project schedule (OPS).

J. Ensure all subcontractors and vendors execute their commissioning responsibilities according to the contract documents and the OPS.

K. Provide required demonstration and training of owner's personnel.

L. Review and accept construction checklists provided by commissioning authority (CxA).

M. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.

N. Cooperate with the CxA for resolution of issues recorded in the "Issues Log"

O. Prepare and provide all documentation as necessary for the compilation of the Systems Manual.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The HVAC Contractor shall provide all standard testing equipment required to perform startup, initial checkout, and testing requirements of Division 23.

B. The Controls Contractor shall provide all standard testing equipment required to test the Building Automation and Automatic Temperature Control System (BAS), including calibration of valve and damper actuators and all sensors. Trend logs for functional testing shall be generated through the BAS interface as requested by the CxA.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the following tolerances. Temperature sensors and digital thermometers shall have a certified calibration, performed within the past year, to an accuracy of 0.5°F and a resolution of ± 0.1 °F. Pressure sensors shall have an accuracy of ± 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES

A. HVAC, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the HVAC, Controls and TAB Contractors of Division 23 are follows:

1. Attend the initial commissioning meeting conducted at the start of construction, the commissioning meeting held 30 days prior to startup of the primary equipment, and all commissioning team meetings.

2. Provide a copy of approved shop drawings and startup reports for all commissioned equipment to the CxA. Supplement the shop drawing data with the manufacturer's installation and start-up procedures. This material should be identical to the literature which will be included in the Operation and Maintenance Manuals.

3. The Operation and Maintenance Manuals shall be submitted to the CM prior to the start of training (three (3) weeks before startup and training and at least sixty (60) days before substantial completion).

4. Perform and document results of Pre-functional Inspections at the direction of the CxA. Ensure that the inspection checklists are completed before startup or as specified by the CxA.

5. During the startup and initial checkout process, execute all portions of the manufacturer's start-up checklists for all commissioned HVAC equipment.

6. Perform and clearly document all completed startup and system operational checkout procedures and provide a copy to the CxA.

7. Perform and document results of equipment functional testing at the direction of the CxA. Ensure that the testing is completed in the timeline specified by the CxA.

8. Address current A/E punch list items and Commissioning corrective action items on the "Issues Log" before functional testing. Air and water TAB shall be completed, with discrepancies and problems remedied, before functional testing of the respective air-or water-related systems.

9. Provide skilled technicians to execute starting of equipment and to perform tests in accordance with all Division 23 sections. Where specified, startup shall be performed by a factory authorized service representative. Ensure that they are available and present during the agreed-upon schedules for the sufficient duration to complete the necessary tests, adjustments and problem-solving.

10. Correct deficiencies (differences between specified and observed performance as interpreted by the CxA and A/E) and retest the equipment.

11. Provide training of Owner's operating staff as specified in Division 23 Sections. Use expert qualified personnel.

12. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

13. Correct deficiencies and make necessary adjustments to O&M manuals for applicable issues identified in any seasonal testing.

B. HVAC Contractor. The responsibilities of the HVAC Contractor, during construction and acceptance phases in addition to those listed in (A) are:

1. Provide startup for all HVAC equipment.

2. Prepare a preliminary schedule for Division 23 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the PM and CxA. Update the schedule as appropriate.

3. Notify the PM and CxA when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment, and TAB will occur. Be proactive in seeing that commissioning processes are executed and that the CxA has the scheduling information needed to efficiently facilitate the commission process.

4. Calibrations: The HVAC Contractor is responsible to calibrate all factory-installed sensors and actuators. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated by the HVAC Contractor.

5. Supervise all commissioning activities executed by subcontractors, including the Controls Contractor.

6. List and clearly identify on the as-built duct and piping drawings the locations of all flow meters, fire and smoke dampers, duct detectors, temperature sensors, relative humidity sensors, CO2 sensors, static and differential pressure sensors (air, water and building pressure).

C. Controls Contractor - The commissioning responsibilities of the Controls Contractor, during construction and acceptance phases in addition to those listed in (A) are:

1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. The submitted sequences shall generally include the following, but can vary according to project needs:

   a. An overview narrative of the system (one or two paragraphs) generally describing its purpose, components and function.
   b. Logic diagrams detailing the flow of information for each control algorithm. These diagrams should include all inputs, outputs, and computations.
   c. All interactions and interlocks with other systems.
   d. Detailed delineation of control between any packaged controls and the building automation system, listing which points the only monitored at the BAS, and which points can be controlled by and adjusted at the BAS.
   e. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included but will generally require additional narrative).
   f. Start-up sequences.
   g. Warm-up mode sequences.
   h. Normal operating mode sequences.
   i. Unoccupied mode sequences.
   j. Shutdown sequences.
   k. Capacity control sequences and equipment staging.
   l. Temperature and pressure control: setbacks, setups, resets, etc.
   m. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
   n. Effects of power or equipment failure with all standby component functions.
   o. Sequences for all alarms and emergency shut downs.
   p. Seasonal operational differences and recommendations.
   q. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   r. Daily/weekly/monthly schedules, as appropriate, if known.
   s. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. Where possible, the numbering sequence shall correspond with Section 23 0460 Automatic Temperature Controls.

2. Control Drawings Submittal:

   a. The control drawings shall have a key to all abbreviations.
   b. The control drawings shall contain graphic schematic depictions of the system and each component.
   c. The schematics shall include the system and component layout of any equipment that the control system monitors, enables, or controls, even if the equipment is primarily controlled by packaged or integral controls.

d. Provide a full points list with at least the following included for each point:

1) Controlled system.
2) Point abbreviation
3) Point description
4) Display unit.
5) Control point or setpoint (Yes/No)
6) Input point (Yes/No)
7) Output point (Yes/No)

e. The controls contractor shall keep the A/E, CxA, HVAC and TAB Contractor informed, in a timely manner, of all changes to this list during programming and setup.

3. Submit a written checkout plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional testing. At minimum, the checkout plan shall include for each type of equipment controlled by the building automation system:

a. System name.

b. List of devices.

c. Step-by-step procedures for testing each controller after installation, including:

1) Process of verifying proper hardware and wiring installation.
2) Process of downloading programs to local controllers and verifying that they are addressed correctly.
3) Process for performing and documenting point-to-point checkout for each digital and analog input and output.
4) Process of performing operational checks of each controlled component.
5) Plan and process for calibrating valve and damper actuators and all sensors.
6) A description of the expected field adjustments for transmitter, controllers and control actuators should control responses fall outside of expected values.

d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor, controller or command has “passed” and is operating within the contract parameters.

e. A description of the instrumentation required for testing.

f. Indicate the portion of the controls checkout plan that should be completed prior to TAB using the controls system for TAB work. Coordinate with the CxA and TAB Contractor for this determination.

4. Point-to-Point Checkout: Include in the checkout plan a point-to-point checkout. Each control point tied to a central control system shall be verified to be commanding, reporting and controlling according to its intended purpose. For each output, commands shall be initiated and verified to be functioning by visually observing and documenting the status of the controlled device in the field (e.g. valve or damper actuator response, pump or fan status). For each input, the system or conditions shall be altered to initiate the input response being tested and the response in the control system observed and recorded (e.g. high duct static pressure alarm).

5. Calibrations: The Controls Contractor is responsible to calibrate all field installed sensors and actuators using test and documentation methods approved by the CxA. The HVAC Contractor is responsible to calibrate all factory installed sensors and actuators.

   a. Sensors installed in the unit at the factory, with a calibration certification provided, need not be field calibrated by the HVAC Contractor.

   b. Valve leak-by tests shall be conducted by the Contractor when shown on a construction checklist.

   c. All procedures used shall be fully documented by the Controls Contractor on suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.

6. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as indicated in the Specifications.

7. Provide an official notice to proceed to the CxA and project team upon completion of the Building Automation System (BAS) and Automatic Temperature Control System (ATC) installation, including checkout and calibration of each controlled device, to confirm that all system programming is complete as to all respects of the Contract Documents. This shall be submitted by the Controls Contractor prior to the start of functional testing by the CxA.

D. TAB Contractor: The scope of work for the TAB Contractor is provided in Section 230460.

3.2 SUBMITTALS

A. The Contractor shall send one copy of product data, shop drawings and similar submittals to the CxA at the same time they are submitted to the A/E. The CxA will review the submittals and provide any comments to the A/E for inclusion in their comments. The Architect will transmit to the CxA, for the CxA's use in preparing functional test procedures; one reviewed and approved copy of product data, shop drawings and similar submittals received from the HVAC, Controls and TAB Contractors, pertinent to equipment and systems to be commissioned.

3.3 STARTUP

A. The HVAC, Controls and TAB Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section. Equipment start-up is required to complete systems and sub-systems so they are fully functional, in compliance with the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility, or partially shift that responsibility to any extent onto the Commissioning Agent or Owner.

B. Testing is intended to begin upon completion of a system. Refer to Section 019100 for additional information related to scheduling.

3.4 TESTS

A. The HVAC and Controls Contractors shall provide the necessary support to the CxA to complete functional testing. The Controls Contractor shall fully test and verify all aspects of the BAS Contract Work on a point / system / integrated operational basis for all points, features and functions specified. The following requirements apply to all mechanical and control systems and features that are to be commissioned when referenced below. Tests shall:

1. Verify functionality and compliance with the basis of design for each individual sequence module in the sequence of operations. Verify proper operation of all control strategies, energy efficiency and self-diagnostics features by stepping through each sequence and documenting equipment and system performance. Tests shall include startup, normal operation, shutdown, scheduled 'on' and 'off', unoccupied and manual modes, safeties, alarms, over-rides, lockouts and power failure.

2. Verify operation of systems and components that may be impacted during low, normal and high load conditions and during combinations of environmental and interacting equipment conditions that could reasonably exist and potentially result in adverse system reaction.

3. Verify all alarm and high and low limit functions and messages generated on all points with alarm settings.

4. Verify integrated performance of all components and control system components, including all interlocks and interactions with other equipment and systems.

5. Verify shutdown and restart capabilities for both scheduled and unscheduled events (e.g. power failure recovery and normal scheduled start/stop).

6. Verify proper sequencing of heat transfer elements as required to prevent simultaneous heating and cooling, unless specifically required for dehumidification operation.

7. Verify system response and stability of control loops under different load conditions and determine if additional loop tuning is required for dehumidification operation.

8. When applicable, demonstrate a full cycle from 'off' to 'on' and 'no load' to 'full load' and then to 'no load' and 'off'.

9. Verify time of day schedules and setpoints.

10. Verify all energy saving control strategies.

11. Verify that all control system graphics are complete, that graphics are representative of the systems, and that all points and control elements are shown in the same location on the graphics as they are located in the field.

12. Verify operation control of all adjustable system control points, including proper access level as agreed to during the controls system demonstration.

B. In addition to specific details, and/or standards referenced for acceptance testing indicated in other Division 23 sections, the following common acceptance criteria shall apply to all mechanical equipment, assemblies, and features:

1. For the conditions, sequences and modes tested, the equipment, integral components and related equipment shall respond to varying loads and changing conditions and parameters appropriately as expected, according to the sequence of operation, as specified, according to acceptable operating practice and the manufacturer's performance specifications.

2. Systems shall accomplish their intended function and performance (e.g. provide supply air and water at designated temperature and flow rate, etc., and maintain space conditions in terms of air temperature, relative humidity, and CO2 concentration) at specified levels at varying conditions.

3. Control loops shall be stable under all operating conditions. Control loops shall exhibit a quarter decay ratio type response to a step change or other upset and return to stable operation in a time frame that is reasonable and realistic for the system that they are associated with.

4. Resetting a manual safety shall result in a stable, safe, and predictable return to normal operation by the system.

5. Safety circuits and permissive control circuits shall function in all possible combinations of selector switch positions (hand, auto, inverter, bypass etc.).

6. Additional acceptance criteria may be defined by the CxA when detailed tested procedures are developed.

7. At the CxA's discretion, if large numbers of deficiencies or repeated deficiencies are encountered, the CxA shall suspend functional testing until the Contractor corrects the deficiencies and troubleshoots all remaining systems at issue on their own. The Contractor shall be responsible for any resulting schedule delays that increase the overall time period to complete functional testing.

8. Retesting: The CxA will direct the retesting of the equipment once at no charge to the Owner for their time. The CxA's time and expenses incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction checkout by the installing contractors and spot-checked by the CxA during functional testing.

3.5 WRITTEN WORK PRODUCTS

A. Written work products of Contractors shall consist of the filled out start-up, initial checkout, and test documentation in accordance with all Division 23 sections.

END OF SECTION

SECTION 23 0490

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within two (2) years or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SECTION 26 0100

GENERAL CONDITIONS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 DESCRIPTION OF WORK

A. It is the intention of the Specification and Drawings to call for finish work, tested and ready for operation.

B. Any apparatus, appliance material or work not shown on the Drawings but mentioned in the Specifications, or vice versa, or any incidental accessories or ancillary devices necessary to make ready for operation even if not particularly specified, shall be furnished, delivered and installed under their respective Division without additional expense to the Owner.

C. Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the work as though they were hereinafter specified or shown.

D. Work under each section shall include giving written notice to the Architect of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules and regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each section has included the cost of all necessary items for the approved satisfactory functioning of the entire system without extra compensation.

E. Small scale drilling through walls and floors which may contain asbestos shall be performed by a person with a “restricted asbestos handler allied trades certificate” and shall have a copy of it in his possession at all times while working of the project.

1.2 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of the system and work included in the Contract. (Do not scale the drawings). Consult the Architectural Drawings and details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the general construction supervisor.

B. Work under each section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; do not begin work until unsatisfactory conditions are corrected.

C. Make reasonable modifications in the layout as needed to prevent conflict with work of other Sections of the Specifications or for proper execution of the work.

D. It shall be understood that the right is reserved by the Architect/Engineer to change the location of equipment and apparatus to a reasonable extent as building conditions may dictate, prior to their installation without extra cost to the Owner.

1.3 SURVEYS AND MEASUREMENTS

A. Base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

B. Before proceeding with the work resolve discrepancies between actual measurements and those indicated, which prevent following good practice or intent of the Drawings or Specifications.

1.4 CODES AND STANDARDS

A. The Codes and Standards listed below apply to all Electrical work codes or standards that are mentioned in these Specifications; the latest edition or revision shall be followed:

1. NEMA - Standards
2. ANSI CI - National Electrical Code (NFPA 70)
3. ANSI C50 - Rotating Electrical Machinery
4. ANSI C51.1 - Construction and guide for selection, installation and use of electric motors.
5. ANSI C52.1 - Motors and Generators

B. The following State and Local Codes shall apply: New York State Uniform Fire Prevention and Building Code, and Local Building Codes.

C. The following abbreviations are used within this Division of the Specifications:

1. IES - Illuminating Engineering Society.
2. NEC - National Electrical Code
3. ANSI - American National Standards Institute
4. ASTM - American Society for testing and materials
5. EPA - Environmental Protection Agency
6. IEEE - Institute of Electrical and Electronic Engineers
7. NEMA - National Electrical Manufacturers Association
8. NFPA - National Fire Protection Association.
9. OSHA - Occupational Safety and Health Administration
10. UL - Underwriters Laboratories

1.5 PERMITS AND FEES

A. Give all necessary notices, obtain all permits and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with work of this Division. File all necessary plans, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction; obtain all necessary certificates of inspections for his work and deliver a copy to the Architect before request for acceptance and final payment for the work. Pay fees for utility construction/connections.

B. Include in the work, without extra cost to the Owner, any labor, materials, services, and apparatus, Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

C. All materials furnished and all work installed shall comply with the rules and recommendations of the National Fire Protection Association, with the requirements of the local utility companies, with the recommendations of fire insurance rating organization having jurisdiction and with the requirements of all governmental departments having jurisdiction.

D. All materials and equipment for the electrical portion of the mechanical systems shall bear the approval label of or shall be listed by the Underwriter's Laboratories, Inc.

1.6 TEMPORARY LIGHT AND POWER

A. The Contractor shall furnish, install, maintain and, upon direction to do so, remove system of temporary lighting and power for the use of all construction trades.

B. The Electrical Contractor shall provide adequate electrical service for the needs of all Contracting Trades.

C. Wiring shall be provided for temporary use during building construction, including grounding and fused main cut-off switches. Temporary electric lines with branch switches shall be provided for lighting and for taps for electric tools, pumps and other temporary equipment; all connected to a main line looped through floor spaces and up stair wells or shafts. All power outlets shall be grounded to an equipment ground wire in an approved manner. Electric lines shall be extended to power tools, which cannot be located within reach of extension cords.

D. Light bulbs shall be provided in sufficient quantity to light the building for safety purposes. Extension cords shall be provided as may be essential to the proper execution of the work. Temporary lighting shall be provided for all stairs and other locations where needed for safety or the proper execution of the work.

E. The Electrical Contractor shall maintain temporary lighting and power systems in good working condition, including the relocation and reinstallation when required to avoid interference with the progress of construction.

F. Provide ground-fault personnel ampere protection for all single phase, 15 and 20 ampere receptacles. All receptacles and portable cord connectors shall have NEMA standard locking type configurations.

G. The Electrical Contractor shall turn lights on and off at the beginning and end of each working day of any trade unless otherwise directed. He shall arrange for all temporary light and power for all trades which do not have holidays (days off) similar to the electrical trade. The Electrical Contractor shall patch and repair all openings left damaged by the installation and removal of the temporary light and power.

1.7 MANUFACTURER'S IDENTIFICATION

A. Manufacturer's nameplate, name or trademark and address shall be attached permanently to all equipment and materials furnished under this Division. The nameplate of a contractor or distributor may not be used.

1.8 SHOP DRAWINGS

A. Submit for approval detailed shop drawings of all equipment and materials in accordance with working procedures.

B. Furnish all necessary templates and patterns for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as necessary.

C. Submit shop drawings for the following:

1. Light fixtures.
2. Receptacles, switches, occupancy sensors and lighting controls.
3. Overcurrent protective devices.
4. Panelboards.
5. Clocks and P.A. system components.
6. Fire alarm system.
7. Telecommunications and Audio/Visual including accessories.

8. Generator, transfer switch.
9. Rescue Assist.
10. Lightning Protection.

1.9 MATERIALS AND WORKMANSHIP

A. All materials and apparatus necessary for the work, except as specifically indicated otherwise, shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first class standard article as accepted by the Architect shall be furnished.

B. Furnish the services of an experienced Superintendent who shall be constantly in charge of the installation of the work, together with all skilled workmen, helpers, and labor to unload, transfer, erect, connect up, adjust, start, operate and test each system.

C. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.10 PROTECTION

A. Work under each Section shall include protecting the work and materials of all other Sections from damage from work or workmen, and shall include making good all damage thus caused. Be responsible for work and equipment until finally inspected, tested, and accepted; protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing or other foreign material.

B. Work under each section includes receiving, unloading, uncrating, storing, protecting, setting in place and connecting up completely of any equipment supplied under each section. Work under each section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the above equipment and fixtures which are missing or damaged by reason of mishandling of failure to protect on the part of the Contractor.

1.11 BASES AND SUPPORTS

A. Unless specifically noted otherwise, provide all necessary supports, pads, bases, and piers required for all equipment under this Division. Provide all temporary bases and supports as required.

B. All equipment, unless shown otherwise, shall be securely attached to the building structure. Attachments shall be of a strong and durable nature; any attachments that are, insufficient, shall be replaced as directed by the Architect.

1.12 SLEEVES, INSERTS AND ANCHOR BOLTS

A. All conduits passing through floors, walls or partitions shall be provided with sleeves having an internal diameter one inch larger than the outside diameter of the conduit, or insulation enclosing the conduit.

B. Furnish all sleeves, inserts, and anchor bolts necessary to be installed under other sections of the Specifications to accommodate work of this section.

C. Sleeves through outside walls shall be cast iron sleeves with intermediate integral flange. Sleeves shall be set with ends flush with each face of wall. The remaining space shall be packed with oakum to within 2 inches of each face of the wall. The remaining shall be packed and made watertight with a waterproof compound.

D. Sleeves through concrete floors or interior masonry walls shall be schedule 40 black steel pipe, set flush with finished walls or ceiling surfaces but extending 2 inches above finished floors.

E. Sleeves through interior partitions shall be 22 gauge galvanized sheet steel, set flush with finished surfaces or partitions.

F. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4" inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 1/2" diameter to be passed through the insert body. Strip inserts shall have attached rods having hooked ends to allow fastening to reinforcing rods. Inserts shall be as manufactured by Carpenter and Patterson, Inc. or Grinnell Co., Inc.

G. Penetrations through fire-rated walls, ceilings and floors in which cables, conduits pass, shall be sealed by a UL approved fire stop fitting classified for an hourly rating equal to the fire rating of the floor, wall or ceiling shall be Gedney Fire Seal Type CFSF of CAPS.

1.13 PAINTING

A. All finish painting in finished areas shall be performed by others.

B. All materials shipped to the job site under the Division, such as panels and plates, shall have a prime coat and standard manufacturer's finish unless otherwise specified.

C. Inaccessible conduits, hangers, supports and anchors and ducts shall be coated prior to installing.

D. All components of the fire alarm system raceway shall be painted red. This includes but is not limited to conduit, junction boxes and pullboxes.

1.14 CUTTING AND PATCHING

A. All cutting and patching required for the work of this Division shall be done by this Division.

B. Work under this Division shall include furnishing, locating and setting inserts and/or sleeves. Do all drilling and cutting necessary for the installation.

C. All holes cut through concrete slabs and structural steel shall be punched or drilled from the underside. No structural member shall be cut without the written acceptance of the Architect and all such cutting shall be done in a manner directed by him.

D. Refer to Division 1 for additional requirements.

1.15 SCAFFOLDING, RIGGING AND HOISTING

A. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this Division. Remove same from premises when no longer needed.

1.16 EXCAVATING AND BACKFILLING

A. All excavation and backfilling for the work of this Division shall be performed by Division 2.

1.17 WATERPROOFING

A. Where any work penetrates waterproofing, including waterproof concrete and floors in wet areas. Submit proposed method of installation for review by the Architect before beginning work. Furnish all necessary sleeves, caulking and flashing necessary to make opening absolutely watertight.

1.18 ACCESSIBILITY AND ACCESS PANELS

A. Be responsible for the sufficiency of the size of shafts and chases, the adequate thickness of partitions, and the adequate clearance in double partitions and hung ceilings for the proper installation of the work of this Division.

B. Locate all equipment, which must be serviced, operated or maintained in fully accessible positions. Minor deviations from Drawings may be allowed for better accessibility with approval of the Architect.

1.19 SHUTDOWNS

A. When installation of a new system necessitates the temporary shutdown of an existing electric distribution operating system the connection of the new distribution section shall be performed at such time as designated by and in consultation with the Owner/Construction Manager. Work required after normal business hours shall be done so at no additional cost to the Owner.

1.20 CLEANING

A. Thoroughly clean all equipment of all foreign substances inside and out before being placed in operation.

B. If any foreign matter should stop any part of a system after being placed in operation, the system shall be disconnected, cleaned and reconnected whenever necessary to locate and remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. Upon completion of work remove from the premises all rubbish, debris, and excess materials. Any oil or grease stains on floor areas caused by work of this Division shall be removed and floor areas left clean.

1.21 RECORD DRAWINGS

A. Maintain at the job site a record set of Electrical Drawings on which any changes in location of equipment, panels, devices, and major conduits shall be recorded. Indicate dimensions of all items installed underground or in concrete.

1.22 OPERATING INSTRUCTIONS

A. Upon completion of all work and all tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall instruct the Owner or his representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least 7 days notice to the Owner in advance of this period.

B. Furnish four complete bound sets for delivery to the Architect of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this Division. All instruction shall be submitted in draft for review prior to final issue. Manufacturer's advertising literature or catalogs may not be used for operating and maintenance instruction.

C. In the above-mentioned instructions, include the maintenance schedule for the principal items of equipment furnished under this Division.

D. The manufacturer shall attest in writing that his equipment has been properly installed prior to start. The following is some of the equipment necessary for this inspection: fire alarm system. These letters will be bound into the operating and maintenance books.

1.23 ADJUSTING AND TESTING

A. After all equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests as will assure the Architect that they are in proper adjustment and in satisfactory permanent operating condition.

B. This particular work shall include the services of a factory engineer to inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, there shall be furnished the service of said engineer for the purpose of supervising the initial operation of the equipment and to instruct the personnel responsible for operation and maintenance of the equipment.

C. At the completion of the job when all panels, devices, etc. are at full working load the Contractor shall provide infrared scan thermographic inspection test of all connection points, terminals, etc. of wires #8 AWG and larger to detect "hot-spots" in the electrical current flow. Correct all hot-spots.

1.24 UNDERWRITER'S LABEL

A. All electrical equipment and materials shall be new and shall comply with the standards of and shall bear the label of the Underwriter's Laboratories.

1.25 ELECTRICAL SAFETY INSPECTION

A. Electrical Contractor shall arrange for an Electrical Safety Inspection to be performed by the Local Inspection Agency (i.e.: New York Electrical Inspection Services, Atlantic Inland, Middle Department Inspection Agency). A Certificate of Compliance “Underwriter’s Certificate” shall be issued to the Owner. All costs and coordination required shall be included in this Contractors Base Bid.

1.26 REMOVALS

A. The scope of removals shown on the Drawings are diagrammatic only and indicate the intent of the work to be performed and not the complete scope of demolition and/or removal work. It shall be the responsibility of this Contractor to remove any electrical devices even if not specifically indicated to be removed on these Drawings in order to accommodate new work.

B. All power conductors, control wiring and conduit associated with mechanical equipment such as fans, pumps, etc. designated for removal on the HVAC Drawings shall be removed clear back to the source of power and disconnected. All motor starters, disconnect switches, control devices, etc. shall be removed. Refer to HVAC Drawings for extent of HVAC removals.

C. Any device removed shall include (but shall not be limited to) the removal of all associated wiring, conduit, boxes, and auxiliary devices back to the previous device on the circuit, or back to the panelboard or origin of the circuit or any other items that are not incorporated in new layout, until such removal is complete. If the removal of any device interrupts service of any other device that is to remain, the Contractor shall provide all materials and labor to ensure continuity of service to those devices to remain.

D. Junction boxes, pullboxes, wireways, conduits, or any other devices required to reconnect circuitry shall be installed concealed within the ceilings, partitions and/or walls, floors, no surface or exposed circuiting shall be permitted, unless specifically indicated.

E. The Electrical Contractor shall patch all openings in walls, ceilings or roof that are left open as a result of removals. Refer to cutting and patching section.

F. Any electrical device removed including but not limited to disconnect switches, panelboards, etc. shall be cleaned, protected and turned over to the Owner or disposed of as directed by Owner.

END OF SECTION

SECTION 26 0125

SCOPE OF WORK

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 SCOPE OF WORK

A. The work under this section includes all labor, materials, equipment, tools, transportation and the performance of all work necessary and required for furnishing and installing all Electrical work shown on the Contract Documents, as specified herein and as otherwise required by job conditions or reasonably implied, including, but not necessarily limited to the following:

1. This Contractor shall refer to Section 01 6190 “Matrix of Building System Responsibilities” for additional information for all Building System installations.

2. The replacement of F.A.C.P. (Fire Alarm Control Panel), the addition of new fire alarm devices (i.e., automatic fan shutdown, for new HVAC equipment) and the replacement of the existing ones as shown on Drawings.

3. The contractor shall dispose of all debris, including but not limited to fixtures, equipment, lamps, ballast, wiring devices and the like in accordance with, as defined by governing law and regulations of the jurisdiction where the work is being performed.

4. Removal of existing public address devices in the existing to be renovated areas within the building.

5. Modifications to existing electrical distribution system as indicated on the Drawings.

6. Service switchboards, distribution panelboard, circuit breaker panelboards, feeder, conduit, cables and branch circuit wiring with all connections complete.

7. Provide new diesel generator with sound attenuation enclosure, transfer switch and remote annunciation.

8. Conduit, conduit fittings, junction and pull boxes and all appurtenances necessary for the raceway systems including necessary supports and fasteners.

9. Electrical conductors, connectors, fittings and connection lugs.

10. Branch circuit devices, outlet boxes, pull boxes, motor disconnect switches, etc.

11. Power wiring to HVAC and Plumbing equipment including disconnect switches as shown and/or required by NEC.

12. Provide new telephone wiring/conduit to PBX. Provide new data wiring to data rack patch panel.

13. Lighting fixtures and lamps including site lighting and occupancy sensor.

14. Third Party commissioning of lighting controls. Electrical Contractor shall coordinate the commissioning of lighting controls with Third Party Commission Agent. Refer to specification section 26 0585 and 26 0890 for all requirements.

15. Public address speakers and clocks.

16. Security and camera wiring infrastructure.

17. Stand-alone sound system in Gymnasium, Band, Choral and Digital Art rooms.

18. Lightning Protection and Grounding.

19. Core drilled holes for conduit passing through walls, ceilings and floors.

20. All necessary cutting, patching and core drilling incidental to the electrical work.

21. Rescue assistant call system

22. Temporary light and power.

23. Licenses, permits, inspection and approvals.

24. Grounding as required as per NEC.

25. Sleeves for conduit and watertight caulking between conduit and sleeve.

26. Testing.

27. Cutting, patching and drilling.

28. Excavation, backfill and sand bedding inside building by Electrical Contractor.

29. Excavation, backfill and sand bedding outside of building by others.

30. All concrete work within building shall be done by Electrical Contractor except for the filling in of the Main Electrical Room to increase that total level platform shall be done by General Contractor.

B. Coordination Drawings (if applicable): Attention is directed to Division 1 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the work and failure to honor these requirements may become the basis for denial of any and all claims for either or both “time” and “money”.

1.2 WORK NOT INCLUDED

A. The following related items will be done by others:

1. Furnishing motors and controllers.

2. Concrete work outside building and in the Main Electrical Room to increase that total level platform.

3. Excavation, backfill and sand bedding outside of building.

END OF SECTION

SECTION 26 0150

APPROVED MANUFACTURERS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 APPROVED MANUFACTURERS

A. The following list of manufacturers constitutes an approved list:

1.	Panelboards	Siemens, Square D, GE
2.	Disconnect Switches	Siemens, Square D, GE
3.	Conduit (steel)	Wheatland, Allied, Republic Conduit
4.	Conduit Fittings (steel)	Appleton, Crouse-Hind, O-Z, T & B, M & W
5.	Wire and Cable	General, South Wire, Rome, Cerro
6.	Splicing Connectors	3M, O-Z, Thomas & Betts
7.	Outlet Boxes	Appleton, National, Steel City, Raco
8.	Wiring Devices	Arrow-Hart, Hubbell, P & S
9.	Lamp	GE, Sylvannia, Philips
10.	Motion Sensors	Watt Stopper, Sensorswitch
12.	Fire Alarm System	Edwards System Technologies or approved equal
13.	Public Address System	Rauland-Borg, Bogen or approved equal
14.	Generator	Cummins, CAT or approved equal

B. All materials and appliances shall have listing of Underwriters Laboratories, Inc. and be so labeled, or shall conform to their requirements, in which case certified statements to that effect shall be furnished by the manufacturer with a copy of an examination report by a recognized independent testing laboratory acceptable to the Architect and his Engineer. Use new materials and appliances throughout.

C. Where several types or makes of materials are specified, the Contractor has the option of using any of these, but after a type or make has been selected and has received the approval of the Architect, it shall be used throughout.

D. The Contractor shall provide all structural supports for the proper attachment of equipment supplied by him and also for all equipment supplied to him under other sections of the Specifications for mounting and connections.

E. Secure all equipment to the building structure independently. Do not secure to work of other trades such as ceiling lath, piping racks, etc., unless specified or noted otherwise.

F. Wall mounted equipment shall be directly secured to wall by means of steel bolts. Maintain at least 1/4" air space between equipment and supporting wall. Pre-fabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf and Unistrut, shall be used for mounting arrays of equipment.

G. All fastening, supports, hangers, anchors, etc., shall be of a type made for the specific purpose. On masonry walls, metallic expansion shield and machine screws shall be used. Screws with wooden plugs or anchors will not be acceptable on any part of the work.

END OF SECTION

SECTION 26 0200

CONDUIT

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and liquid tight flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Cutting and patching.

B. Trenching: Excavation and backfill for conduit and utility on site.

C. Sheet metal flashing and trim.

PART 2 - PRODUCTS

2.1 RIGID STEEL CONDUIT

A. Industry standard heavy wall conduit.

B. Minimum 3/4" trade size.

C. Threaded.

D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.2 INTERMEDIATE METAL CONDUIT

A. Industry standard steel conduit.

B. Minimum 3/4" trade size.

C. Threaded.

D. Hot dipped galvanized finish by means of plating after cutting of threads.

2.3 ELECTRICAL METALLIC TUBING

A. Industry standard thin wall conduit of galvanized steel only.

B. Minimum 3/4" trade size.

C. Maximum 4" trade size.

2.4 FLEXIBLE METAL CONDUIT

A. Galvanized steel tape formed into an industry standard interlocking coil.

B. Minimum 3/4" trade size except for connection of lighting fixtures.

C. Grounding type.

D. Separate ground conductor.

E. Use for short connections to motor terminal box, other vibrating equipment using a minimum length of 18" with 50% slack and a maximum of 6'.

F. From outlet box to recessed lighting fixtures with a maximum length of 6'.

2.5 WIREWAYS

A. Lay-in type, UL listed as wireway or auxiliary gutter.

B. Wireway shall be of code gauge steel construction (UL standard for Wireway Auxiliary Gutters and Associated Fittings) with removable cover. Tamperproof screws shall be provided for sealing covers to prevent access by unauthorized personnel. Wireway shall be provided with knockouts.

C. Connector and covers shall be attached so that removal of connectors is not necessary to utilize the lay-in feature.

D. Finish: All sheet metal parts shall be provided with a rust inhibiting phosphating coating and baked enamel finish. All hardware shall be plated to prevent corrosion. All screws extending into the wireway shall be protected by spring nuts or otherwise guarded to prevent wire insulation damage.

2.6 CONDUIT SUPPORTS

A. Conduit clamps, straps and supports: Steel or malleable iron.

2.7 CONDUIT FITTINGS

A. Use compression fittings for all EMT in exposed areas. Utilize set screw fittings only above hung ceilings and concealed areas.

2.8 SURFACE METAL RACEWAY

A. Metal raceway shall be of a two-piece design with a base and snap-on cover.

B. Raceway and all components shall be listed by Underwriters Laboratories

C. Single Channel: Steel, zinc plated, off-white finish suitable for repainting. Two piece design with metal base and snap-on cover. Wire Mold V700, Hubbell Inc. 750 Series or Panduit PMR5/PMR7

D. Dual Channel: Steel, galvanized, off-white finish but suitable for repainting. Two-piece design with metal base and snap-on cover, minimum 0.04" thick base and cover. Base shall be divided by a removable barrier section. Provide duplex receptacles mounted in top cell and communication outlets in the bottom cell. Coordinate communications jack requirements with Owner’s IT personnel. Provide Wiremold V4000, Wiremold DS4000 Series, Hubbell Inc. 4000 Series or Panduit PMR40.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

A. Minimum size - 3/4". Provide grounding bushings on all conduits 1-1/4" and larger.

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

D. Draw up couplings and fittings full and tight. Protect threads cut in field from corrosion. Paint newly threaded joints of steel conduit with T & B "Kopershield" compound before installation. Running threads prohibited; use three-piece unions or split couplings instead. Use only compression fittings for all EMT in areas where it will be exposed in finished and unfinished areas. Provide set screw fittings only when installed above hung ceilings.

E. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12-inch clearance between conduit and heat sources such as flues; steam pipes and heating appliances.

F. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

H. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

I. Exposed conduit on ceiling shall be parallel or perpendicular to wall and vice versa to ceiling when installed on wall. Secure conduit clamps and supports to masonry materials by toggle bolt, expansion bolt or steel insert. Spacing or conduit supports shall not exceed 7 feet.

3.2 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter, deburr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Install no more than the equivalent of three 90-degree bends between boxes.

E. Use conduit bodies to make sharp changes in direction, as around beams.

F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.

G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.

J. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.

K. Where conduit penetrates fire-rated walls and floors, provide pipe sleeves two sizes larger than conduit; pack void around conduit with fire-stop fittings with UL listed fire rating equal to wall or floor ratings; Seal opening around conduit with UL listed foamed silicone elastomer compound.

L. Installation of conduit in slab shall comply with ACI 318.

M. Route conduit through roof openings for piping and duct work where possible; otherwise, route through roof with pitch pocket.

N. Maximum size conduit in slabs above grade: 1 inch. Do not route conduits to cross each other in slabs above grade. Conduits crossing each other may not be larger than 3/4 inch.

O. All conduit used for fire alarm system shall be painted red.

3.3 CONDUIT INSTALLATION OF SCHEDULE

A. Underground installations: PVC minimum Schedule 40 conduit, unless otherwise noted on Drawings.

B. Installations in or under concrete slab: PVC minimum Schedule 40 conduit, unless otherwise noted on Drawings.

C. Exposed outdoor locations: Rigid galvanized steel conduit.

D. Wet interior locations: Rigid galvanized steel conduit.

E. Concealed dry interior locations and above accessible ceiling for receptacle and lighting branch wiring: Electrical metallic tubing up to first junction box and flexible metallic tubing (MC cable only) thereafter.

F. Concealed dry interior locations other than receptacle and lighting branch wiring: Electrical metallic tubing.

G. Concealed dry interior locations and above accessible ceiling for fire alarm runs: Fire alarm armored cable type MC with red stripe as manufactured by AFC series 1800.

H. Concealed and exposed dry interior location for feeder runs: Electric metallic tubing.

I. Exposed dry interior in unfinished locations other than Boiler Rooms: Electric metallic tubing.

J. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 10” to maximum of 6’ for connections to motors.

K. Existing exposed dry interior locations (finished spaces), for branch wiring and fire alarm wiring, one-piece steel raceway (similar to Wiremold V-500, V-700).

L. Final connections to motors: Flexible metallic tubing (MC cable). Minimum of 18” to maximum of 6’ for connections to motors.

M. All conduit installed in boiler room up to 10’-0” AFF and lower shall be rigid galvanized steel conduit. All conduit above 10’-0” shall be electric metallic tubing.

N. Final connections to equipment and/or motors in boiler room, outdoors and potentially wet indoor areas: liquid tight, flexible; minimum of 18” to maximum 6’-0” connections.

END OF SECTION

SECTION 26 0300

WIRE AND CABLE

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to wire and cable in raceway specified in other sections to complete all work shown on the Drawings or specified herein.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Thermoplastic-insulated building wire: Type THHN.

B. Rubber insulated building wire: NEMA WC 3.

C. Feeders and branch circuits larger than number 6 AWG: Copper, stranded conductor, 600 volt insulation, type THHN.

D. Feeder and branch circuits 6 AWG and smaller: Copper conductor, 600 volt insulation, THWN/THHN, 6 and 8 AWG, stranded conductor; Smaller than 8 AWG, solid conductor.

E. Service feeders and branch circuits in conduit in contact with earth shall be type XHHW/XHHW-2.

F. Control circuits: Copper, stranded conductor 600 volt insulation, THHN.

2.2 ARMORED CABLE

A. BX or pre-manufactured cables are not acceptable except for Type MC for branch wiring after the first junction box (for receptacle and lighting branch circuits) and final connections to motors in interior dry accessible locations, minimum length shall be 18” with a maximum length of 6’ for motors.

B. Type MC fire alarm cable with red stripe for concealed fire alarm wiring as manufactured by AFC series 1800.

C. Armored cable, Type MC size 14 through 6 AWG: Copper conductor, 600 volt thermoplastic insulation, rated 90 degrees C., with separate green ground conductor.

2.3 REMOTE CONTROL AND SIGNAL CABLE

A. Control cable for Class 2 or Class 3 remote control and signal circuits: Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together shielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts and plenums. Verify wiring type with manufacturer.

2.4 COLOR CODING

A. All wiring shall be color-coded. Neutral wire shall be white throughout and each phase wire shall be identified any place in the system by its color code. All conductors in panel boxes and junction boxes shall be properly tagged with red non-flammable tags properly attached.

B. Wire shall be color coded as follows:

120/208 volt system		480/277 volt system		Fire Alarm
A Phase	Black	A Phase	Brown	Red
B Phase	Red	B Phase	Orange	
C Phase	Blue	C Phase	Yellow	

C. Equipment ground wires or ground jumpers shall be Green.

D. In addition to the basic color-coding described the following additional identification and tagging shall apply.

1. The switch legs for the local wall switches and in switch panel shall have distinctive stripes. In instances where color-coding is not practicable, such as short runs of heavy feeder cables, taping the ends of the cable with coded colors as indicated above or tagging will be permitted.

2. Cables shall be tagged in all pull boxes, wireways and wiring gutters of panels.

3. Where two (2) or more circuits run to or through a control device, outlet box or junction box, each circuit shall be tagged as a guide in making connections.

4. Tags shall identify wire or cable by number and/or piece of equipment served as shown on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet and for 20 ampere.

C. Use 10 AWG conductor for 20 ampere, 277 volt branch circuit home runs longer than 200 feet for 20 ampere.

D. Place an equal number of conductors for each phase of a circuit in same raceway or cable. No more than one of each phase shall be supported by a single neutral.

E. Splice only in junction or outlet boxes.

F. Neatly tag, identify, train and lace wiring inside boxes, equipment and panelboards.

G. Make conductor lengths for parallel circuits equal.

3.2 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricate for pulling 4 AWG and larger wires.

B. Completely and thoroughly swab raceway system before installing conductors.

C. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

3.3 CABLE INSTALLATION

A. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or metal cable ties to support cables from structure (not ceiling suspension system). Include bridle rings or drive rings.

B. Use suitable cable fitting and connectors.

3.4 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.

B. Use solderless pressure connections with insulating covers for copper wire splices and tape, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

C. Provide extended gutters and tap blocks or pull boxes with tap rail systems similar to Burndy MT Series or Burndy Electrorail system for wire splices 6 AWG and larger.

D. Tape uninsulated conductors with electrical tape to 150 percent of the insulation value of conductor.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Terminate spare conductors with electrical tape.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of the Specifications.

B. Inspect wire and cable for physical damage and proper connection.

C. Torque test conductor connections and terminations to manufacturers recommended values.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.6 WIRE AND CABLE INSTALLATION SCHEDULE

A. All wiring and cable shall be installed in conduit unless otherwise noted. Refer to conduit section 26 0200 for conduit types at various location.

END OF SECTION

SECTION 26 0320

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. Work of this section includes all labor, materials, equipment and services necessary to complete the electrical work as shown of the Drawings and specified herein, including, but not limited to, the following:

B. Fuses

1. Current limiting cartridge fuses.

2. Time delay cartridge fuses.

C. Circuit Breakers

1. Standard molded case circuit breakers "bolted in" type.

2. Solid state circuit breakers.

3. Current limiting circuit breakers.

4. Enclosed circuit breakers.

1.2 SUBMITTALS

A. Shop drawings showing dimensions, location of equipment and method of installation.

B. Product Data: Manufacturer’s printed data, catalog cuts.

1.3 DISCONNECT SWITCHES

A. Fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position. Fuse clips shall be designed to accommodate Class R, J fuses.

B. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover when switch is in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA Type 1, 3R or 4 as required.

1.4 FUSES

A. Voltage ratings of fuses shall be suitable for the supply characteristics to which they are applied.

B. Fuse type and size shall be suitable for installation in related disconnect switch or circuit breaker.

C. Current limiting fuses shall be as follows:

1. Regardless of actual available fault current, they shall, at full recovery voltage, be capable of safely interrupting fault currents of 200,000 amperes RMS symmetrical or 280,000 amperes RMS asymmetrical, deliverable at the line side of the fuse.

2. They shall have average melting time-current characteristics to meet the Underwriters' Laboratories requirements for "Class RK-1" 0-600 amp fuses.

D. Regardless of actual available fault current, they shall be capable of limiting peak let through current to the following values based on 200,000 amperes RMS symmetrical or 280,000 amperes asymmetrical being available:

Rating In Amperes	Peak Let Through Current In Amps
15-30	6,000
35-50	8,000
70-100	12,000
125-200	20,000
225-601	38,000

E. Fuses shall be rejection type. Fuse clip shall be rejection type.

F. Fuse Type and Application Table:

Category of Application	Acceptable Fuse Types (Bussman Designations @ 600V)
Motor feeder	LPS below 600A
Power panel feeders	LPS below 600A
Safety switches	LPS

1.5 CIRCUIT BREAKERS

A. "Bolted-In" type, manually operated, quick-make, quick-break, mechanically trip-free operating mechanisms for simultaneous operation, of all poles, with contacts, arc interrupters and trip elements for each pole. "Plug-in" breakers are not permitted. New circuit breakers to be installed in existing panelboards shall be U.L. certified for installation in those panelboards and be labeled with make and model.

B. Tripping units shall be "thermal-magnetic" type having bimetallic elements for time delay overload protection, and magnetic elements for short circuit protection.

C. Manually operable by mean of toggle type operating handles having tripped positions midway between the "on-off" position. Handle to be clearly labeled as to breaker rating.

D. Minimum frame size for all circuit breakers, 1, 2, or 3 pole shall be 100 amperes.

E. Their interrupting rating shall not be less than 25,000 amperes RMS symmetrical at 208 volt for distribution panels and 10,000 amperes for power panels.

1.6 APPLICATIONS

A. Category of Application for Fuses

1. Feeders on switchboards.

2. Branch fused switch unit in distribution panel.

3. Fused safety switch.

4. Combination motor starters.

B. Category of Application for Circuit Breakers

1. Panelboards.

2. Switchboards.

3. Individual enclosures.

4. Combination motor starters.

1.7 SPARE FUSES

A. Upon Engineer's acceptance of the electrical distribution system, provide spare fuses as follows: 13% of each type and rating installed 200 amperes and smaller. Provide spare fuse cabinet with directory to store all spare fuses. Locate as directed by Engineer and/or Owner.

1.8 APPROVED MANUFACTURERS

A. Fuses: Bussman, Ferraz-Shawmut.

B. Circuit Breakers: Siemens, General Electric, Square D.

1.9 INSTALLATION

A. All material installation shall be in accordance with manufacturer recommendations and the provisions of all applicable codes.

B. All fuses and circuit breakers shall be selectively coordinated.

C. Install disconnect switches where indicated on Drawings.

D. Install fuses in fusible disconnect switches.

E. Disconnects shall have NEMA 3R enclosure.

1.10 RECORD DRAWINGS

A. Shop drawings showing dimensions, location of equipment and method of installation.

B. Product Data: Manufacturer’s printed data, catalog cuts, performance curves.

END OF SECTION

SECTION 26 0350

BOXES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install wall and ceiling outlet boxes, floor boxes, pull and junction boxes to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Access doors.

B. Wiring devices: Service fittings and fire-rated poke-through fittings for floor boxes.

C. Cabinets and enclosures.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Sheetmetal outlet boxes: ANSI/NEMA OS 1; Galvanized steel, with 1/2 inch male fixture studs where required.

B. Cast boxes: Cast feralloy, deep type, gasketed cover, threaded hubs.

C. Typical receptacle box shall be 4" square metal boxes, 30.8 cubic inch capacity with brackets as required. Provide 4" square raised device covers.

2.2 PULL AND JUNCTION BOXES

A. Sheetmetal boxes: ANSI/NEMA OS 1; Galvanized steel.

B. Sheetmetal boxes larger than 12 inches in any dimension: hinged enclosure in accordance with Section 26 0450.

C. Cast metal boxes for outdoor and wet location installations: NEMA 250; Type 4 and type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

D. Cast metal boxes for underground installation: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless cover screws.

PART 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as required in excess of that shown on Drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.

B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

C. Locate and install boxes to allow access. Where installations are accessible, coordinate locations and sizes of required access doors with Division 1.

D. Locate and install to maintain headroom and to present neat appearance.

3.2 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.

B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit except for cast iron boxes that are connected of rigid metal conduits, both supported within 12 inches of box.

E. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in wall without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches and backspaces.

H. Position outlets to locate luminaries as shown on reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.

J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.

3.3 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

3.4 FLOOR BOX INSTALLATION

A. Set boxes level and flush with finish flooring material.

B. Use cast iron floor boxes for installation in slab on grade.

END OF SECTION

SECTION 26 0400

WIRING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install receptacles, service fittings device plates and box covers to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

A. FS W-C-596 - Electrical power connector, plug, receptacles and cable outlet.

B. FS W-S-896 - Switch, toggle.

C. NEMA WD 1 - General purpose wiring devices.

D. NEMA WD 5 - Specific-purpose wiring devices.

1.3 SUBMITTALS

A. Submit product data under Provisions of Contract and Division 1.

B. Provide product data showing configurations, finishes, dimensions and manufacturer's instructions.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. Convenience and straight-blade receptacles: 125 V, 2 pole, 3 wire, 20 ampere specification grade, ground fault interrupting or isolated ground type.

B. Internal ground clip of receptacles shall be in one piece with the receptacle mounts.

C. Receptacles with riveted ground clips will not be accepted.

2.2 WALL SWITCHES

A. Wall switches for lighting circuits and motor loads under 1/2 hp: AC general use snap switch with toggle handle, rated 20 amperes and 120-277 volts AC.

B. Handle: Ivory plastic.

C. Pilot light type: Lighted handle. Pilot strap in adjacent gang.

D. Locator type: Lighted handle.

2.3 COVER PLATES

A. Decorative cover plate: Stainless steel 302/304 smooth Hubbell "S" series.

2.4 DIGITAL LIGHTING CONTROLS

A. Refer to Section 26 0585 and Drawings for all information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install receptacles on roof along parapet wall or on indicated equipment.

B. Install specific use receptacles at heights shown on contract drawings.

C. Drill opening for poke - through fitting installation in accordance with manufacturer's instructions.

D. Install plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.

E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

F. Install devices and wall plates flush and level.

END OF SECTION

SECTION 26 0450

CABINETS AND ENCLOSURES

PART 1 - GENERAL

Applicable Provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install hinged cover enclosures to complete all work shown on the Drawings or specified herein.

1.2 REFERENCES

A. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

B. Submittals - Submit product data under Provisions of Contract and Division 1.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Construction: NEMA 250; Type 1 and 3R steel.

B. Finished: Manufacturer's standard enamel finish.

C. Covers: Continuous hinge, held closed by operable by key.

D. Provide barriers between normal and emergency wiring. Barriers shall be of non-current carrying material of adequate thickness for mechanical strength but in no case less than 1/4". Each barrier shall have an angle iron framing support all around.

2.2 FABRICATION

A. Shop assemble enclosures in accordance with ANSI/NEMA ISC 6.

B. Provide knockouts on enclosures.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install enclosures plumb; Anchor securely to wall and structural supports at each corner, minimum.

B. Provide necessary feet for free-standing equipment enclosures.

C. Install trim plumb.

END OF SECTION

SECTION 26 0500

SUPPORTING DEVICES

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install rigid metal conduit, electrical metallic tubing and flexible metal conduit, including all fittings to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Conduit and equipment supports.

B. Fastening hardware.

1.3 REFERENCES

A. Conduit supports.

1.4 QUALITY ASSURANCE

A. Support system shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Support channel: Galvanized or painted steel.

B. Hardware: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, outlet, junction boxes to building structure using preset inserts, beam clamps and spring steel clips.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; Expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use powder-actuated anchors.

E. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

F. In wet locations install free-standing electrical equipment on concrete pads.

G. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.

H. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

END OF SECTION

SECTION 26 0550

GENERAL LABELING AND IDENTIFICATION

PART 1 - GENERAL

Applicable Provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all material, labor, tools and services necessary to install nameplates, tape labels, wire markers, conduit color coding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Painting.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Division 1.

B. Include schedule for nameplates and tape labels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.

B. Tape labels: Embossed adhesive tape with 3/16 inch black letters on a white background.

C. Wire and cable markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. De-grease and clean surfaces to receive nameplates and tape labels.

B. Install nameplates and tape labels parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.

D. Embossed tape will not be permitted for any application. Use embossed tape only for identification of individual wall switches and receptacles and control device stations.

3.2 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes and at load connection. Identify each branch circuit or feeder number for power and lighting circuits and each control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates to identify all electrical distribution, control equipment and loads served including year of installation. Letter height: 1/2 inch for individual switches, loads served, distributions and control equipment identification. For example:

MP-1 INSTALLED 2019

B. Panelboards: 3/4 inch, identify equipment designation. 1/2 inch, identify voltage rating and source of power.

C. Individual circuit breakers, switches and motor starters in panelboards, switchboards and motor control centers: 1/4 inch, identify circuit and load served, including location.

D. Individual circuit breakers, enclosed switches and motor starters: 1/2 inch, identify load served.

3.4 FIRE ALARM

A. All fire alarm raceway components shall be painted red and identified.

END OF SECTION

SECTION 26 0575

INTERIOR LUMINAIRES

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. Interior luminaires and accessories.

B. Emergency lighting units.

C. Exit signs.

D. LED Driver.

E. LED dimming and controls.

F. LED emergency power supply.

G. Lamps.

H. Luminaire accessories.

1.2 REFERENCES

A. ANSI/IES RP-16-10 – Nomenclature and Definitions for Illuminating Engineering.

B. ANSI C78.37 7 – Specifications for the Chromaticity of Solid-State Lighting (SSL) Products.

C. IES LM-79-08 – Electric and Photometric Measurements of Solid-State Lighting Products.

D. IES LM-80-08 – Measuring Lumen Maintenance of LED Light Sources.

E. IES 7M-21-11 – Projecting Long Term Lumen Maintenance of LED Light Sources.

F. IES LM-82-11 – IES Approved Method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.

G. UL 8750 – LED Equipment for Use in Lighting Products.

H. NEMA WD 6 - Wiring Devices – Dimensional Requirements.

I. NFPA 70 - National Electrical Code.

J. NFPA 101- Life Safety Code.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70 and to requirements of NFPA 101.

B. Products: Listed and classified by Underwriters Laboratories, Inc. (UL), American National Standards Institute (ANSI) and Illuminating Engineering Society (IES).

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish Products as scheduled.

2.2 EXIT SIGNS

A. Manufacturers: As scheduled.

B. Description: Exit sign fixture suitable for use as emergency lighting unit.

C. Housing: Extruded aluminum or steel as per schedule.

D. Face: Aluminum stencil face with red letters, unless otherwise noted.

E. Directional Arrows: Universal type for field adjustment, direction per drawing.

F. Mounting: Universal, for field selection or per drawing.

G. Lamps: L.E.D.

H. Input Voltage: As scheduled.

2.3 LED DRIVERS

A. Manufacturers: As scheduled.

B. Voltage: As scheduled.

2.4 LAMPS

A. Lamp Types: As specified for luminaire. LED source.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendent length required to suspend luminaire at indicated height.

B. Support luminaires 2 x 4 foot (600 x 1200 mm) and larger in size independent of ceiling framing.

C. All lay-in luminaries shall be supported with chains to building structure.

D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.

F. Install wall mounted luminaires, emergency lighting units and exit signs at 80" above finished floor, unless otherwise noted.

G. Install accessories furnished with each luminaire.

H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 LIGHT LEVEL / FOOT CANDLE PERFORMANCE

A. The light levels / footcandle performance for all areas through out the building shall match the performance as per the specified fixtures. If this contractor substitutes the specified fixtures indicated in the Lighting Schedule in the Contract Documents then this contractor shall submit foot candle calculations for each room and area demonstrating that the substituted fixtures meets or outperforms the specified fixtures.

3.4 ADJUSTING

A. Aim and adjust luminaires as indicated.

B. Position exit sign directional arrows as indicated.

3.5 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finished and touch up damage.

3.6 PROTECTION OF FINISHED WORK

A. Relamp luminaires that have failed lamps as substantial completion.

END OF SECTION

SECTION 26 0585

DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SUMMARY

A. Section Includes

1. Digital Lighting Controls
2. Relay Panels
3. Emergency Lighting Control (if applicable)

B. Related Sections

1. Section 26 0400 Wiring Devices: Receptacles
2. Section 26 0575 Interior Luminaires.
3. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent – Control Intent includes, but is not limited to:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings
4. Task lighting and receptacle controls
5. Emergency Lighting control (if applicable)

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

B. Underwriter Laboratories of Canada (ULC)

C. International Electrotechnical Commission (IEC)

D. International Organization for Standardization (ISO)

E. National Electrical Manufacturers Association (NEMA)

F. WD1 (R2005) - General Color Requirements for Wiring Devices.

G. Underwriters Laboratories, Inc. (UL)

1. 20 – Plug Load Controls
2. 508– Industrial Controls
3. 916 – Energy Management Equipment.
4. 924 – Emergency Lighting

1.3 SYSTEM DESCRIPTION & OPERATION

A. The Lighting Control and Automation system as defined under this section covers the following equipment:

1. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
2. Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
3. Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
4. Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting.
5. Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
6. Digital Plug-Load Controllers – Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities.
7. Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.
8. Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
9. Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control
10. Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.
11. Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
12. Programming and Configuration software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication.
13. LMCP Digital Lighting Management Relay Panel – provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS).
14. LMZC-301 – Digital Zone Controller. Accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS).
15. Emergency Lighting Control Unit (ELCU) – allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building.

1.4 LIGHTING CONTROL APPLICATIONS

A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used.
3. Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
4. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
    a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
    b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
    c. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
    d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
5. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.

1.5 SUBMITTALS

A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.

B. Shop Drawings

1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
2. Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans.)
3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Include data for each device which:
   1. Indicates where sensor is proposed to be installed.
   2. Prove that the sensor is suitable for the proposed application.

1.6 QUALITY ASSURANCE

A. Manufacturer: Minimum [10] years experience in manufacture of lighting controls.

1.7 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
   1. Ambient temperature: 0° to 40° C (32° to 104° F).
   2. Relative humidity: Maximum 90 percent, non-condensing.

1.8 WARRANTY

A. Provide a five year limited manufacturer's warranty on all room control devices and panels.

1.9 MAINTENANCE

A. Spare Parts

   1. Provide spares of each product to be used for maintenance as listed below: Refer to design documents. Coordinate with owner for quantity prior to purchase order.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer

   1. WattStopper
      a. System: Digital Lighting Management (DLM)

   2. Basis of design product: WattStopper Digital Lighting Management (DLM) or subject to compliance and prior approval with specified requirements of this section, one of the following:
      a. Refer to design documents.

B. Substitutions: [If Permitted]

   1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.

   2. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design highlighted for review and approval prior to rough-in.

2.2 DIGITAL LIGHTING CONTROLS

A. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

2.3 DIGITAL WALL SWITCH OCCUPANCY SENSORS

A. Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons.

B. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:

    a. Sensitivity – 0-100% in 10% increments
    b. Time delay – 1-30 minutes in 1 minute increments
    c. Test mode – Five second time delay
    d. Detection technology – PIR, Dual Technology activation and/or re-activation.
    e. Walk-through mode
    f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:

    a. Each sensor may be programmed to control specific loads within a local network.
    b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
    c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
    d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
        i Ultrasonic and Passive Infrared
        ii Ultrasonic or Passive Infrared
        iii Ultrasonic only
        iv Passive Infrared only

3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

4. Two RJ-45 ports for connection to DLM local network.

5. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.

6. Device Status LEDs including:
    a. PIR detection
    b. Ultrasonic detection
    c. Configuration mode
    d. Load binding

7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.

8. Assignment of local buttons to specific loads within the room without wiring or special tools.

9. Manual override of controlled loads.

10. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.

C. BACnet object information shall be available for the following objects:

1. Detection state
2. Occupancy sensor time delay
3. Occupancy sensor sensitivity, PIR and Ultrasonic
4. Button state
5. Switch lock control
6. Switch lock status

D. Units shall not have any dip switches or potentiometers for field settings.

E. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

F. Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:
1. Left button
   a. Press and release - Turn load on
   b. Press and hold - Raise dimming load
2. Right button
   a. Press and release - Turn load off
   b. Press and hold - Lower dimming load

G. Low voltage momentary pushbuttons shall include the following features:

1. Load/Scene Status LED on each switch button with the following characteristics:

   a. Bi-level LED
   b. Dim locator level indicates power to switch
   c. Bright status level indicates that load or scene is active

2. The following button attributes may be changed or selected using a wireless configuration tool:

   a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
   b. Individual button function may be configured to Toggle, On only or Off only.
   c. Individual scenes may be locked to prevent unauthorized change.
   d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
   e. Ramp rate may be adjusted for each dimmer switch.
   f. Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

H. WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

A. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.

B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:
   a. Sensitivity – 0-100% in 10% increments
   b. Time delay – 1-30 minutes in 1 minute increments
   c. Test mode – Five second time delay
   d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
   e. Walk-through mode
   f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:
   a. Each sensor may be programmed to control specific loads within a local network.
   b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
   c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
   d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
      i Ultrasonic and Passive Infrared
      ii Ultrasonic or Passive Infrared
      iii Ultrasonic only
      iv Passive Infrared only

3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

4. One or two RJ-45 port(s) for connection to DLM local network.

5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

6. Device Status LEDs, which may be disabled for selected applications, including:
   a. PIR detection
   b. Ultrasonic detection
   c. Configuration mode
   d. Load binding

7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.

8. Manual override of controlled loads.

9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

C. BACnet object information shall be available for the following objects:

1. Detection state
2. Occupancy sensor time delay
3. Occupancy sensor sensitivity, PIR and Ultrasonic

D. Units shall not have any dip switches or potentiometers for field settings.

E. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

F. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.5 DIGITAL WALL SWITCHES

A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:

1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

3. Configuration LED on each switch that blinks to indicate data transmission.

4. Load/Scene Status LED on each switch button with the following characteristics:
   a. Bi-level LED
   b. Dim locator level indicates power to switch
   c. Bright status level indicates that load or scene is active

5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.

6. Programmable control functionality including:
   a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
   b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.

7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

B. BACnet object information shall be available for the following objects:

1. Button state
2. Switch lock control
3. Switch lock status

C. Two RJ-45 ports for connection to DLM local network.

D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

E. The following switch attributes may be changed or selected using a wireless configuration tool:

1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
2. Individual button function may be configured to Toggle, On only or Off only.
3. Individual scenes may be locked to prevent unauthorized change.
4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
5. Ramp rate may be adjusted for each dimmer switch.
6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.

F. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.6 HANDHELD REMOTE CONTROLS

A. Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:

1. Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet.
2. LED on each button confirms button press.
3. Load buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
4. Inactivity timeout to save battery life.

B. A wall mount holster and mounting hardware shall be included with each remote control.

C. WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105.

2.7 DIGITAL PARTITION CONTROLS

A. Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors.

B. Four-button low voltage pushbutton switch for manual control.

1. Two-way infrared (IR) transceiver for use with configuration remote control.
2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Configuration LED on each switch that blinks to indicate data transmission.
4. Each button represents one wall; Green button LED indicates status.
5. Two RJ-45 ports for connection to DLM local network.
6. WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening.

C. Contact closure interface for automatic control via input from limit switches on movable walls (by others).

1. Operates on Class 2 power supplied by DLM local network.

2. Includes 24VDC output and four input terminals for maintained third party contract closure inputs.
   a. Input max. sink/source current: 1-5mA
   b. Logic input signal voltage High: >18VDC
   c. Logic input signal voltage Low: <2VDC

3. Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.

4. Two RJ-45 ports for connection to DLM local network.

5. WattStopper part number: LMIO-102

2.8 DIGITAL DAYLIGHTING SENSORS

A. Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring.

1. Closed loop sensors measure the ambient light in the space and control a single lighting zone.
2. Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.
3. Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone.

B. Digital daylighting sensors shall include the following features:

1. The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
2. Sensor light level range shall be from 1-6,553 foot candles (fc).
3. The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
4. For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
6. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
7. Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
8. Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.

9. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
10. Configuration LED status light on device that blinks to indicate data transmission.
11. Status LED indicates test mode, override mode and load binding.
12. Recessed switch on device to turn controlled load(s) ON and OFF.
13. BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
    a. Light level
    b. Day and night setpoints
    c. Off time delay
    d. On and off setpoints
    e. Up to three zone setpoints
    f. Operating mode – on/off, bi-level, tri-level or dimming
14. One RJ-45 port for connection to DLM local network.
15. A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.
16. Any load or group of loads in the room can be assigned to a daylighting zone
17. Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).
18. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.

C. Closed loop digital photosensors shall include the following additional features:

1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.
4. WattStopper Product Number: LMLS-400, LMLS-400-L.

D. Open loop digital photosensors shall include the following additional features:

1. An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room.
2. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
3. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
4. WattStopper Product Number: LMLS-500, LMLS-500-L.

E. Dual loop digital photosensors shall include the following additional features:

1. Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside of this con
2. Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room.
3. Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load.
4. Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is required.
5. Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes.
6. Device must include extendable mounting arm to properly position sensor within a skylight well.
7. WattStopper product number LMLS-600

2.9 DIGITAL ROOM CONTROLLERS AND PLUG-LOAD CONTROLLERS

A. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.

2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf.

3. Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.

4. Device Status LEDs to indicate:
   a. Data transmission
   b. Device has power
   c. Status for each load
   d. Configuration status

5. Quick installation features including:
   a. Standard junction box mounting
   b. Quick low voltage connections using standard RJ-45 patch cable

6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
   a. Turn on to 100%
   b. Remain off
   c. Turn on to last level

7. Each load shall be configurable to operate in the following sequences based on occupancy:
   a. Auto-on/Auto-off (Follow on and off)
   b. Manual-on/Auto-off (Follow off only)

8. The polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.

9. BACnet object information shall be available for the following objects:
   a. Load status
   b. Electrical current
   c. Total watts per controller
   d. Schedule state – normal or after-hours
   e. Demand response control and cap level
   f. Room occupancy status
   g. Total room lighting and plug loads watts
   h. Total room watts/sq ft
   i. Force on/off all loads

10. UL 2043 plenum rated

11. Manual override and LED indication for each load

12. Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.

13. Zero cross circuitry for each load

14. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

B. On/Off Room Controllers shall include:

1. One or two relay configuration
2. Efficient 150 mA switching power supply
3. Three RJ-45 DLM local network ports with integral strain relief and dust cover
4. WattStopper product numbers: LMRC-101, LMRC-102

C. On/Off/Dimming enhanced Room Controllers shall include:

1. Real time current monitoring

2. Multiple relay configurations
   a. One, two or three relays (LMRC-21x series)
   b. One or two relays (LMRC-22x series)

3. Efficient 250 mA switching power supply

4. Four RJ-45 DLM local network ports with integral strain relief and dust cover

5. One dimming output per relay
   a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
   b. Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
   c. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
   d. The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
   e. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.
   f. Calibration and trim levels must be set per output channel.
   g. Devices that set calibration or trim levels per controller are not acceptable.
   h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

6. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.

7. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.

8. The following dimming attributes may be changed or selected using a wireless configuration tool:
   a. Establish preset level for each load from 0-100%
   b. Set high and low trim for each load
   c. Set lamp burn in time for each load up to 100 hours

9. Override button for each load provides the following functions:
   a. Press and release for on/off control
   b. Press and hold for dimming control

10. WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222

D. Plug Load Room Controllers shall include:

1. One relay configuration with additional connection for un-switched load
2. Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10 minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated).
3. Factory default operation is Auto-on/Auto-off, based on occupancy
4. Real time current monitoring of both switched and un-switched load (LMPL-201 only)
5. Efficient switching power supply
   a. 150mA (LMPL-101)
   b. 250mA (LMPL-201)
6. RJ-45 DLM local network ports
   a. Three RJ-45 ports (LMPL-101)
   b. Four RJ-45 ports (LMPL-201)
7. WattStopper product numbers: LMPL-101, LMPL-201.

2.10 DLM LOCAL NETWORK (Room Network)

A. The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.

B. Features of the DLM local network include:

1. Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
3. Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

C. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.

D. If manufacturer's pre-terminated Cat 5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results.

E. WattStopper Product Number: LMRJ-Series

2.11 DLM SEGMENT NETWORK (Room to Room Network)

A. The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control.

1. Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network.

2. Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections.

3. The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms.

4. Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device.

5. Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements.

6. Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERs, via BACnet/IP or BACnet/Ethernet. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable.

B. WattStopper Product Number: LM-MSTP, LM-MSTP-DB

2.12 CONFIGURATION TOOLS

A. A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include but not be limited to:

1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
3. Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number.
4. Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
8. Verify status of building level network devices.

C. WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

2.13 NETWORK BRIDGE

A. The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver.

1. The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port.
2. Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:
   a. Read/write the normal or after hours schedule state for the room
   b. Read the detection state of each occupancy sensor
   c. Read the aggregate occupancy state of the room
   d. Read/write the On/Off state of loads
   e. Read/write the dimmed light level of loads
   f. Read the button states of switches
   g. Read total current in amps, and total power in watts through the room controller
   h. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings

i. Activate a preset scene for the room
j. Read/write daylight sensor fade time and day and night setpoints
k. Read the current light level, in foot candles, from interior and exterior photosensors and photocells
l. Set daylight sensor operating mode
m. Read/write wall switch lock status
n. Read watts per square foot for the entire controlled room
o. Write maximum light level per load for demand response mode
p. Read/write activation of demand response mode for the room
q. Activate/restore demand response mode for the room

B. WattStopper product numbers: LMBC-300

2.14 SEGMENT MANAGER

A. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).

B. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans.

C. Operational features of the Segment Manager shall include the following:

1. Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.
2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC.
3. Log in security capable of restricting some users to view-only or other limited operations.
4. Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.
5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.
7. Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays, and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules.
8. Ability to group rooms and loads for common control by schedules, switches or network commands.
9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.

10. Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control.
11. The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.

D. Segment Manager shall support multiple DLM rooms as follows:
1. Support up to 120 network bridges and 900 digital in-room devices (LMSM-3E).
2. Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E).

E. WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16.

2.15 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.

1. Additional parameters exposed through this method include but are not limited to:
   a. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
   b. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
   c. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
   d. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
   e. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
   f. Load control polarity reversal so that on events turn loads off and vice versa.
   g. Per-load DR (demand response) shed level in units of percent.
   h. Load output pulse mode in increments of 1second.
   i. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.

2. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
   a. Device list report: All devices in a project listed by type.
   b. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
   c. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
   d. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.

e. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
f. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).
g. Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors.

3. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
   a. Set, copy/paste an entire project site of sensor time delays.
   b. Set, copy/paste an entire project site of sensor sensitivity settings.
   c. Search based on room name and text labels.
   d. Filter by product type (i.e. LMRC-212) to allow parameter set by product.
   e. Filter by parameter value to search for product with specific configurations.

4. Network-wide firmware upgrading remotely via the BACnet/IP network.
   a. Mass firmware update of entire rooms.
   b. Mass firmware update of specifically selected rooms or areas.
   c. Mass firmware upgrade of specific products.

B. WattStopper Product Number: LMCS-100, LMCI-100

2.16 EMERGENCY LIGHTING CONTROL DEVICES

A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
   1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
   2. Push to test button
   3. Auxiliary contact for remote test or fire alarm system interface

B. WattStopper Product Numbers: ELCU-100, ELCU-200.

PART 3 – EXECUTION

3.1 CONTRACTOR INSTALLATION AND SERVICES

A. Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs.

B. Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable following installation, and shall supply the lighting controls manufacturers with test results. Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings.

C. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication.

D. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.

E. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
   1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
   2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
   3. Load Parameters (e.g. blink warning, etc.)

F. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.

3.2 FACTORY SERVICES

A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. The Electrical Contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.

C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

3.3 COMMISSIONING SUPPORT SERVICES

A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

B. The commissioning agent shall work with the Electrical Contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

C. Refer to specification section 26 0890 Electrical Systems commissioning for additional requirements and coordination with Third Party Commissioning Agent.

END OF SECTION

SECTION 26 0600

DISCONNECT SWITCHES

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install disconnect switches, fuses and enclosures to complete all work shown on the Drawings or specified herein.

1.2 SUBMITTALS

A. Submit product data under Provisions of Contract and Division 1.

B. Include outline Drawings with dimensions, equipment ratings for voltage, capacity, horsepower and short circuit.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. Siemens.

B. Square 'D'.

C. General Electric.

D. Or approved equal.

2.2 DISCONNECT SWITCHES

A. Non-fusible switch assemblies: Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

B. Enclosures: NEMA Type 1; 3R; 4 as indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on Drawings.

B. Disconnects installed outdoors shall have NEMA 3R enclosures.

C. Disconnects installed indoors in dry locations shall have NEMA 1 enclosure.

END OF SECTION

SECTION 26 0650

GROUNDING

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the power system grounding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Panelboards.

B. Raceways.

C. Connection Equipment.

D. Electric Equipment.

E. Tests and Acceptance.

1.3 SUBMITTALS

A. Manufacturers' data, catalog cuts of ground rods, connectors, bushings, etc., along with recommended installation procedures.

PART 2 - PRODUCTS

2.1 WIRING

A. All wiring used for grounding shall be insulated copper, unless otherwise noted. Size shall be in accordance with code for the application, minimum #12.

B. Where used in conjunction with computer equipment, grounding conductors shall be equal in size to the phase conductors.

C. Avoid splices in ground conductors.

2.2 RACEWAY

A. Grounding continuity shall be maintained for all metallic raceways.

B. Provide bonding jumpers across metal parts separated by non-conducting materials.

C. Where a grounding conductor is installed as a supplement to metallic raceway serving as the equipment grounding conductor, bonding conductor to the raceway at each end.

D. All raceway accessories, such as locknuts, bushings, expansion fittings, etc. shall be installed to provide maximum metal-to-metal bonding.

2.3 CLAMPS

A. Provide approved ground clamps for connecting grounding conductors to pipe, conduits, wireways, building steel, grounding rods, etc.

B. Where bond will be in an inaccessible location or as an alternate to ground clamps, provide exothermic weld, similar to Cadweld.

2.4 ACCESSORIES

A. Provide all necessary accessories of appropriate size and material for connection or termination of grounding conductors including:

1. Straps.
2. Clamps.
3. Lugs.
4. Bars and buses.
5. Isolators (where applicable).
6. Locknuts and bushings.

2.5 ACCEPTABLE MANUFACTURERS

A. Copperweld.

B. Cadweld (for exothermic welds).

C. O.Z. Gedney.

D. Burndy.

PART 3 - EXECUTION

3.1 STRUCTURAL STEEL BUILDINGS

A. Select a column common to aligned electric closets as the bonding column for grounding of transformer neutrals, isolated grounds and separate equipment grounding conductors.

B. All grounding conductors in each closet shall be bonded in close proximity to one another.

C. Where a grounding conductor to be bonded is not in proximity to the common column, bond to the nearest column or structural beam.

D. Provide bonding jumper strap across all structural expansion joints where the grounding integrity of the structural system is reduced

3.2 RACEWAYS

A. Grounding continuity is to be maintained for all metallic raceways. Provide necessary clamps, bushings, straps and locknuts to assure continuity.

B. For non-metallic or flexible raceways, provide a separate equipment-grounding conductor bonded to both ends.

C. Where indicated, an additional equipment-grounding conductor shall be provided in metallic raceway.

D. Where indicated, an isolated ground conductor shall be provided in addition to the equipment-grounding conductor. Bond at each end to the isolated ground terminal identified.

3.3 EQUIPMENT

A. All equipment shall be grounded.

B. Where isolated grounding is indicated, it shall be for the isolation of internal equipment components only. All metallic enclosures of such equipment shall be connected to the equipment ground system.

3.4 PANELBOARDS

A. All panelboards and distribution panels shall be provided with a ground bar bonded to the enclosure. Provide an isolated ground bar connected to the incoming feeder ground where indicated.

3.5 TESTING

A. Upon completion of the installation, confirm the grounding continuity of all raceways, conductors and equipment. Maximum allowable resistance is 25 ohms.

3.6 RECORD DRAWINGS

A. Submit record As-Built Drawings indicating the location of all points where grounding conductors are bonded to steel, rods, plates, etc.

B. Indicate the location of all grounding buses not installed within distribution equipment.

END OF SECTION

SECTION 26 0675

HIGH PERFORMANCE DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. Fabricate and test low voltage dry-type distribution transformers as described in this specification and on the Drawings.

1.2 SUMMARY

A. Transformers on this project significantly exceed basic DOE 2016 requirements being optimized to provide 33% energy savings on average compared to a comparable DOE 2016 transformer when feeding predominately electronic equipment in the 0-25% loading range.

B. General Purpose Transformers do NOT meet this specification as they do not carry a UL Listing for this application.

C. Other highlights of requirements of this specification include:

1. Copper wound
2. K-7 rated
3. No load loss limits
4. Efficiency under nonlinear loading to ensure real world performance
5. 105% continuous duty overload capacity
6. Performance Validation Reports for each unit shipped on project signed by professional engineer
7. Lockable Hinged Door to reduce arc flash risk when accessing for maintenance & thermal scans

D. Information to be submitted with bid:

1. Line-by-line compliance, deviation, exception for this specification
2. Performance Guarantee by Manufacturer that ALL transformers on this project will meet specified performance.
3. Failure to provide this information will result in a non-compliant proposal.

1.3 REFERENCES

A. US Department of Energy, 10 CFR Part 431 – Energy Efficiency Program for Certain Commercial and Industrial Equipment, Subpart K – Distribution Transformers

B. US Department of Energy, 10 CFR Part 429 – Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment

C. ANSI/NEMA ST 20 - 2014 - Dry Type Transformers for General Applications.

E. Metering Standards:

1. Computational algorithms per IEEE Std 1459-2000
2. UL 916, UL 61010C-1 CAT III

F. IEEE C57.110-2008 – IEEE Recommended Practice for establishing liquid-filled and dry-type power distribution transformer capability when feeding nonsinusoidal load currents

G. IEEE Std C57.12.91-1995 Standard Test Code for Dry-Type Transformers

H. IEEE-1100 – Recommended Practice for Powering and Grounding Sensitive Electronic Equipment

I. LEED – Leadership in Energy and Environmental Design, U.S. Green Building Council.

J. Seismic Qualification References: International Building Code, 2006/2009 Edition, California Building Code, 2007/2010 Edition, ASCE Standard 7, 2005 Edition to OSHPD CAN 2-1708A.5, Rev. , ICC-ES AC 156, Effective 01/01/2007, OSHPD

K. ISO 9001:2008 – International Standards Organization - Quality Management System

L. ISO 14001:2004 – International Standards Organization - Environmental Management System

M. ISO 17025 – International Standards Organization - General requirements for the competence of testing and calibration laboratories

1.4 BID PROPOSAL

A. Compliance Review

1. Submit a complete copy of these specifications with each subparagraph marked either "compliance", "deviation", or "exception". Fully describe all deviations and exceptions taken to this specification.

   a. "Compliance": Comply with no exceptions.
   b. "Deviation": Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
   c. "Exception": Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives.

2. Unless a deviation or exception is specifically noted in the Compliance Review, it is assumed that the Bidder is in complete compliance with this Specification. Deviations or exceptions taken in cover letters, subsidiary documents, by omission or by contradiction do not release the Bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review. Bidders may submit the latest state-of-the-art components and their standard control components in lieu of the specified items. All deviations from the Specifications must be approved by the Architect/Engineer.

3. Failure to provide this information will result in a non-compliant proposal.

1.5 SUBMITTALS - Submit product data including the following:

A. Manufacturer documentation guaranteeing that ALL units on the project will comply with the performance requirements of this specification.

B. Where one or more of the integrated transformer options is selected for this project, provide associated documentation.

C. Insulation system impregnant data sheet as published by supplier.

D. Construction details including enclosure dimensions, kVA rating, primary & secondary nominal voltages, voltage taps, BIL, unit weight.

E. Basic Performance characteristics including insulation class, temperature rise, core and coil materials, impedances & audible noise level, unit weight.

F. Manufacturer documentation that sizing primary protection at 125% of nominal full load amps will not result in nuisance tripping on transformer inrush.

G. Documentation of UL listing of 2" clearance from ventilated surface.

H. Inrush Current (typical 3 cycle recovery).

I. Short Circuit Current data: Primary & Secondary.

J. Efficiency, Loss & Heat output Data.

K. No load and full load losses per NEMA ST20.

L. Linear load data @ 1/6 load.

M. Linear load data @ 1/4, 1/2, 3/4 & full load.

N. Linear Load efficiency @ 35% loading tested per NEMA TP-2.

O. Efficiency under K7 load profile at 16.7%, 25%, 50%, 75%, 100% of nameplate rating.

P. Factory ISO 9001 procedure describing nonlinear load test program
   1. Meter and CT details including model, accuracy, serial numbers and calibration information.

Q. 32 year Product and Performance Warranty Certificate.

R. Manufacturer's ISO 14001:2004 Certification.

S. Manufacturer's ISO 9001:2008 Certification.

T. ISO 17025 Certificate - Efficiency Test Lab where transformers are tested.

U. Documentation that materials used for shipment packaging meet the environmental requirements of this specification.

V. For LEED projects, provide the following additional submittal information:
   1. Optimize Energy Performance: Provide savings calculations vs. DOE 2016 baseline reference

1.6 CLOSEOUT SUBMITTALS

A. Comprehensive Operations and Maintenance Manual

B. Applicable wiring diagrams, including any modifications made

C. Copies of completed factory and site testing reports.

1.7 NONLINEAR LOAD TEST PROGRAM

A. Efficiency shall be determined by actual measurements using a nonlinear load bank. Calculations based on software modeling is not acceptable.

B. Nonlinear Load Testing shall be carried out by an ISO 17025 Certified Efficiency Test Lab, and follow a defined protocol, independently audited within the manufacturer's certified ISO system.

C. Follow IEEE Std C57.12.91-1995 Standard Test Code for Dry-Type Transformers to determine efficiency. Proprietary or non-standard methodology is not acceptable.

D. The nonlinear load bank shall consist of phase-neutral loads, representative of a mix of electronic equipment.

E. Meters and CTs shall both be revenue class accurate and carry current calibration certificates. CTs shall be operated within their approved accuracy loading range. Dual meters shall gather simultaneous primary and secondary energy and harmonic data. Meter and CT details including model, accuracy, serial numbers and calibration information.

F. Efficiency: Measurements shall be taken at multiple load levels and plotted to show compliance with specification and correlation to the designed efficiency curve.

G. Harmonic data including current and Voltage THD at the different load levels shall be included with the test report.

1.8 PACKAGING FOR SHIPMENT

A. Transformers shall be packaged for shipment using materials that reduce environmental impact:

1. Transformer Wrapping
   a. Transformers shall be wrapped for shipment in material that is recyclable or compostable at the destination

2. Transformer Shipping Base
   a. Transformers shall be shipped on a base that uses at least 50% less wood than traditional pallets.
   b. Wood used in the shipping base shall be Forestry Stewardship Council (FSC) certified as having been sustainably harvested.

3. Shall minimize labor, risk of injury and equipment damage, while handling from initial transportation through to final placement of the transformer.

1.9 DELIVERY, STORAGE AND HANDLING

A. Store and protect products

B. Store in a warm, dry location with uniform temperature. Cover ventilation openings to keep out dust, water and other foreign material.

C. Handle transformers using lifting eyes and/or brackets provided for that purpose. Protect against unfavorable external environment such as rain and snow, during handling.

1.10 WARRANTY

A. Transformer shall carry a 32-year pro-rated warranty, which shall be standard for the product line.

B. Guaranteed Performance: Manufacturer warranty shall explicitly state that **every** transformer is guaranteed to meet published performance data.

C. Manufacturer warranty shall remain in effect through a qualified seismic event.

1.11 COMMERCIAL PRODUCT

A. Transformer shall be a standard item in the manufacturer's catalog.

1.12 FACTORY WITNESS TESTING

A. At time of order, the customer may request that the project engineer or other designated customer representative witness the performance testing of one or more of the transformers on the project at the manufacturer's facility, along with a demonstration of integrated metering option if specified.

1.13 PERFORMANCE VALIDATION REPORTS

A. A Performance Validation Report shall be provided for EACH transformer shipped on this project as follows:

1. Documentation shall be certified and signed by a (factory) professional engineer (PE), and identify each product by model and serial number.
2. Transformers shall be tested in an ISO 17025 Certified Test Lab.
3. Validation Report shall contain two components:
   a. Test Report per DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431, identifying no load losses, and efficiency at 35% loading.
   b. Routine Test Report per NEMA ST20 including audible noise test for each unit.

1.14 INTERNATIONAL STANDARDS ORGANIZATION REGISTRATION

A. Registration of the manufacturer to current versions of the following ISO standards is required.

1. ISO 9001:2008 – Quality Management System
2. ISO 14001:2004 – Environmental Management System

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCT

A. Basis of Design: E-Saver-33L by Powersmiths International Corp. (contact Andy Topinka andy@tgs-inc.com 862-210-8126)

B. Manufacturers wishing to have products evaluated for acceptability and conformance with the performance requirements of this specification, shall provide detailed compliance and/or exception statements, along with the documentation required in the submittal section, including test documentation, signed by an engineer, that confirms that the transformer(s) meets the specified performance.

C. Failure to provide the required documentation no less than 7 days prior to the bid date will disqualify products from consideration for this project.

2.2 TRANSFORMER SPECIFICATION

A. Compatibility: This product must facilitate the ability of the electrical system to supply a sinusoidal voltage in order to improve the long-term compatibility of the electrical system with both linear and nonlinear loads.

B. 3-phase, common core, ventilated, dry-type, isolation transformer built to UL1561, NEMA ST20 and other relevant NEMA, UL and IEEE standards; 200% rated neutral; 60Hz rated; Transformers shall be UL or cUL Listed, and/or CSA Approved. All terminals, including those for changing taps, must be readily accessible by removing a front cover plate. Windings shall be continuous with terminations brazed or welded. 10kV BIL.

C. Lugs are not provided by the transformer manufacturer.

D. Winding Material: Copper

E. K-Rating: K-7 (per IEEE-C57.110)

F. Impedance: 4.0% or greater (unless otherwise noted) in order to manage downstream fault and arc flash levels and required downstream component fault interrupting (kAIC) ratings.

G. Inrush: Inrush currents are managed in order to avoid nuisance tripping of the primary breaker and to enable the use of standard 125% rated primary protection, thereby avoiding expensive design changes that otherwise may be needed.

H. Operating Temperature Rise: 130 degree C in a 40 degree C maximum ambient

I. Continuous Duty Overload Capacity: 105% of nominal kVA Rating

J. Voltage Taps: For transformers 15kVA-750kVA, provide two 2-1/2% full capacity taps above and four 2-1/2% taps below nominal primary voltage.

K. Audible Noise levels

1. Every unit to meet required noise level. Production Test every unit. Data to be available upon request.

2. Must meet 3 dB quieter than NEMA ST-20 as follows:
   a. up to 50kVA: 42dB, 51-150kVA: 47dB, 151-300kVA: 52dB, 301-500kVA: 57dB, 501-700kVA: 59dB, 701-1000kVA: 61dB

L. Enclosure type: Ventilated NEMA 1 enclosure with Lockable Hinged Doors
1. Provide lockable hinged doors on the transformer to facilitate access in support of NFPA 70E/CSA-Z462 Arc Flash Standard to minimize arc flash risk when opening the enclosure of live equipment

M. Rear Clearance: UL Listed for 2” clearance from the wall rather than standard 6”. This capability shall be explicitly described on the nameplate of each unit.

N. Exceed minimum efficiency requirements of US Department of Energy, 10 CFR Part 431 (DOE 2016), by complying with the table of Maximum No Load Losses, efficiency requirements at 1/6 load, efficiency at 35% load, and efficiency at 25% load under a K-7 load profile. Testing backed by ISO 17025 efficiency test lab.

kVA	Max. No load losses (Watts)	Efficiency @ 1/6 load (%)	Efficiency @ 35% load (%)	Efficiency at 25% load under K-7 nonlinear load
15	34	98.17	98.24	98.18
20	42	98.27	98.34	98.28
25	50	98.37	98.44	98.38
30	57	98.47	98.54	98.48
45	80	98.61	98.71	98.62
50	86	98.64	98.73	98.65
63	101	98.71	98.79	98.72
75	114	98.78	98.84	98.78
100	145	98.85	98.93	98.85
112.5	160	98.88	98.97	98.88
125	175	98.90	98.99	98.88
150	204	98.93	99.03	98.88
175	229	98.96	99.06	98.95
200	255	99.00	99.10	99.01
225	281	99.03	99.13	99.08
250	304	99.05	99.15	99.08
300	352	99.09	99.20	99.08
400	431	99.15	99.24	99.13
450	471	99.17	99.26	99.16
500	511	99.20	99.28	99.18
600	597	99.22	99.30	99.22
750	726	99.24	99.33	99.28

O. Maximum Allowable Footprint:

kVA	Standard Case Size (in)	Alternate Smaller Case Size (in)*
15	17.5W x 17D x 27.5H	17.5W x 14.5D x 25H
20	25.5W x 18D x 30H	23W x 15.5D x 27.5H
25	25.5W x 18D x 30H	23W x 15.5D x 27.5H
30	25.5W x 18D x 30H	23W x 15.5D x 27.5H
45	25.5W x 18D x 30H	25.5W x 16D x 29H
50	25.5W x 18D x 30H	No Alternate
63	31.5W x 21.5D x 40H	26.5H x 20D x 33H
75	31.5W x 21.5D x 40H	26.5H x 20D x 33H
100	31.5W x 21.5D x 40H	30.5H x 20D x 35H
112	31.5W x 21.5D x 40H	30.5H x 20D x 35H
125	37.5W x 26.5D x 48H	33W x 23D x 38H
150	37.5W x 26.5D x 48H	33W x 23D x 38H
175	37.5W x 26.5D x 48H	34.5W x 26.5D x 42H
200	37.5W x 26.5D x 48H	34.5W x 26.5D x 42H
225	37.5W x 31.5D x 52H	34.5W x 26.5D x 42H
250	37.5W x 31.5D x 52H	37.5W x 26.5D x 48H
300	37.5W x 31.5D x 52H	37.5W x 26.5D x 48H
400	51.5W x 38D x 61H	43.5W x 33.5D x 55.5H
450	51.5W x 38D x 61H	43.5W x 33.5D x 55.5H
500	51.5W x 38D x 61H	43.5W x 33.5D x 55.5H
600	64W x 47D x 67H	51.5W x 38D x 61H
750	64W x 47D x 67H	Contact Factory

P. Seismic Qualification: been seismically qualified in accordance with: International Building Code, 2006/2009 Edition, California Building Code, 2007/2010 Edition, ASCE Standard 7, 2005 Edition to OSHPD CAN 2-1708A.5, Rev. , ICC-ES AC 156, Effective 01/01/2007, OSHPD approved: OSP-0110-10

1. Unit shall remain operational and shall not suffer electric or mechanical damage within the limits of a qualified seismic event

2. Certification Level: Short period spectral acceleration: SDS= 1.5 g, Seismic importance factor: Ip= 1.5, Installation height: z/h= 1.0, Installation restrictions: None - Valid for below grade, at grade and roof installations in floor mounted configuration.

Q. Insulation System

1. Shall be NOMEX-based with an Epoxy Co-polymer impregnant for lowest environmental impact, long term reliability and long life expectancy.
2. Class: 220 degrees C.
3. Impregnant Properties for low emissions during manufacturing, highest reliability and life expectancy.
4. Epoxy co-polymer.
5. VOC: less than 1.65 lbs/gal (low emissions during manufacturing).

6. Water absorption (24hrs @25C): less than 0.05% (superior insulation, longer life).
7. Chemical Resistance: Must have documented excellent performance rating by supplier.
8. Dielectric Strength: minimum of 3200 volts/mil dry (for superior stress, overvoltage tolerance).
9. Dissipation Factor: max. 0.02 @25C to reduce aging of insulation, extending useful life.

R. Transformer Options To Be Included On This Project

1. Integrated long term Power & Energy Logger

   a. Supports NFPA 70E/CSA-Z462 Arc Flash Standard to provide operating data without opening transformer enclosure
   b. Basis of design: Equivalent or superior to Powersmiths Express Logger.
   c. Meter shall be factory-installed inside the transformer, connected to the transformer secondary, complete with fused voltage connections, revenue class 0.5 or better CTs
   d. Access for meter setup, real time data viewing, event log, and downloading of logged data is via an integrated USB access port on the enclosure of the transformer.
   e. Parameters measured include: V, I, PF, Hz, kW, kVA, kVAR, kWh, Ad, KWd, kVAd, kVARd, temperature, including the option to log min, max, average or instantaneous values of any of the parameters.
   f. The meter shall log real-time data at user selected intervals, as well as an event log when measured values have exceeded user defined thresholds.
   g. The logger shall be able to store a year of monthly peak demands.
   h. The logger shall be able to log up any 2 selected data points for over 10 years, more data points for shorter period.

2. Supply integrated meter having features described above (Basis of Design: Powersmiths SMART 2A).

3. Integrated Access Port to Transformer Output Voltages and Currents to enable spot checks of load profile measurement without opening transformer enclosure.

   a. Supports NFPA 70E/CSA-Z462 Arc Flash Standard to provide operating data without opening transformer enclosure
   b. Supply access to transformer output voltages and currents without opening the enclosure, via twistlock connectors, in support of NFPA 70E/CSA-Z462 Arc Flash Standard to avoid arc flash risk as associated with opening the enclosure of live equipment
   c. Currents shall be accessed via integrated FTRZ listed 333mV CTs.

4. Lug Kit: Supply with standard screw-type lugs as specified at time of order.

5. Lug Kit: supply with Compression lugs configured as specified at time of order.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow all national, state and local codes with respect to transformer installation.

B. Where sound level may be of concern, utilize the services of a recognized and established Acoustical Consultant to provide the proper installation environment to minimize noise and vibration.

C. Check for damage and loose connections.

D. Set the transformer plumb and level.

E. Mount transformer on vibration isolation pads suitable for isolating the transformer.

F. Provide Seismic restraints where required.

G. Coordinate all work in this Section with that in other sections.

H. Verify all dimensions in the field.

I. Adjust transformer secondary voltages to provide the required voltage at the loads.

J. Upon completion of the installation, an infrared scan shall be provided for all bolted connections. Correct any deficiencies. Repeat thermal scan 3 months after installation and prepare a report for the customer.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and review test results.

B. Tests and Inspections

1. Perform each visual and mechanical inspection and electrical test stated in
2. Follow NETA Acceptance Testing Specification.
3. Certify compliance with tests

3.3 PERFORMANCE VALIDATION

A. To ensure that the products shipped to the job site meet this specification, provide on-site revenue class accurate efficiency and harmonic measurements of transformers once installed and operating at customer's site. Data shall be collected from primary and secondary sides of the transformer simultaneously on a synchronized cycle by cycle basis. The use of two discrete meters that are not synchronized is not acceptable. Sampling shall be of 10% of transformers on the project once installed and operating, as selected by customer. Submit a detailed report to the project engineer.

B. Where integrated metering has been specified to be connected to an external network, contractor to provide the required connection and commissioning to customer's specified system.

C. Identify non-compliant products to the engineer and replace at no cost to the customer.

END OF SECTION

SECTION 26 0700

PANELBOARDS

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work under this section shall include the furnishing of all materials, labor, tools and services necessary to install the power system grounding to complete all work shown on the Drawings or specified herein.

1.2 RELATED WORK

A. Grounding

B. Overcurrent Protection

1.3 SUBMITTALS

A. Submit shop drawings for equipment and component devices under provisions of Division 1.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Furnish two (2) sets of keys to Owner.

1.4 REFERENCES

A. FS W-C-375 - Circuit breakers, molded case, branch circuit and service.

B. FS W-P-115 - Power distribution panel.

C. NEMA AB 1 - Molded case circuit breakers.

D. NEMA KS 1 - Enclosed switches.

E. NEMA PB 1 - Panelboards.

F. NEMA PB 1.1 - Instruction for safe installation, operation and maintenance of panelboard rated 600 volts or less.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PANELBOARD AND LOAD CENTERS

A. Siemens.

B. Square "D".

C. General Electric.

D. Or approved equal.

2.2 BRANCH CIRCUIT PANELBOARDS

A. Lighting and appliance branch circuit panelboards: NEMA PB 1; circuit breaker type.

B. Enclosure: NEMA PB 1; Type 1.

C. Cabinet size: Approximately 6 inches deep; 20 inches wide for 240 volt and less panelboards. Verity field conditions and alter dimensions to suit at no additional cost.

D. Provide surface cabinet front door-in-door with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, rating as scheduled on Drawings. Provide copper ground bus in all panelboards and isolated ground bus in those as indicated on Drawings.

F. Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 240 volt rated for 125 amps or less, 22,000 amperes rms symmetrical for 240 volt rated greater than 125 amps to 225 amps and 30,000 amperes for emergency power panelboards (verify in field). If panelboard is noted as a main distribution panelboard, than panel shall be rated as a distribution panelboard. Contractor shall provide short circuit study to ensure adequacy.

G. Molded case circuit breakers: Bolt-on type thermal magnetic trip handle for all poles. Provide circuit breakers UL listed as type SWD for lighting circuits. Breaker handle to indicate ampere rating.

2.3 DISTRIBUTION PANELBOARDS

A. Description: NEMA PB 1, circuit breaker type. The bus of all panels rated a minimum 400 amps shall be distribution type.

B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

C. Minimum integrated short circuit rating: 65,000 amperes rms symmetrical for 240 volt panelboards; 65,000 amperes rms symmetrical for 480 volt panelboards, unless otherwise noted on Drawings.

D. Model Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR as specified on Drawings.

E. Enclosure: NEMA PB 1, Type 1.

F. Cabinet Front: Surface type, fastened with screws. Double hinged doors with flush lock, metal directory frame, finished in manufacturer’s standard gray enamel. One hinged door to access breakers, the other to access wiring compartment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards flush or surface mounted as indicated on Drawings.

B. Mounting height maximum 6 ft. (2 m) to top circuit breaker.

C. Provide filler plates for unused spaces in panelboards.

D. Provide type written circuit directory for each branch circuit panelboard. Indicate loads served and panel name by matching that shown on panel schedules on Drawings. Revise directory to reflect circuiting changes required to balance phase loads. Provide a second copy and turn over to Owner.

E. Provide 3/4" thick plywood backboard for mounting of panels. Paint backboard with fire retardant paint.

F. Provide nameplates as indicated in Section 26 0550.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and mechanical inspection: Inspect for physical damage, proper alignment, anchorage and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches and fuses.

C. Provide thermographic inspections in accordance with Section 26 0100.

3.3 TESTS

A. Submit certification that each panelboard has withstood, without breakdown, a factory dielectric (Hi-Pot) test consisting of a one minute application of a 60 cycle AC test voltage applied between phase legs and from each phase leg to enclosure.

B. The applied test voltage shall have an RMS value of at least twice the line to line system voltage to which the panelboard is to be applied, plus one thousand volts (minimum 1500V).

3.4 RECORD DRAWINGS

A. Submit As-Built Drawings indicating the location of all panelboards.

END OF SECTION

SECTION 26 0725

DISTRIBUTION SWITCHBOARD

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, vendors and the like shall meet all Con Edison requirements.

1.2 SUMMARY

A. Work of this section shall be governed by the contract documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified herein and/or as required by job conditions.

B. The work shall include, but not be limited to, indoor, low voltage switchboards of the circuit breaker, front accessible only, rear aligned, groove mounted type, as shown on the drawings and specified herein.

1.3 REFERENCES

A. Related Work Specified Elsewhere

1. General Conditions: Section 26 0100

2. Overcurrent Protective Devices: Section 26 0320

1.4 INTENT AND CODES

A. This specification describes the equipment required. It does not cover all phases of manufacture or assembly. Supplier shall assume the responsibility for providing well-integrated units of good quality.

B. All codes, rules, regulations and ordinances governing this work, are as fully a part of this specification as if herein repeated or hereto attached. Where the requirements of this specification are more stringent than any applicable codes etc., the specification shall apply.

1.5 MATERIAL AND WORKMANSHIP

A. Unless otherwise specified all materials shall be new. Supplier shall be responsible for defects in equipment and devices furnished but not manufactured by him. Exposed finishes and other features shall match in all respects. Supplier alone shall be responsible for all errors of fabrication and for correct fitting of all components that must be erected and joined in the field.

1.6 SHOP DRAWINGS

A. Complete shop drawings showing size and arrangement of equipment, foundation and anchor bolt requirements, bill of materials, performance data and curves, wiring and elementary diagrams, methods of assembly, connections to other work and other pertinent data as called for in the various parts of this Specification shall be furnished by the Supplier for checking and approval.

1.7 MAINTENANCE AND OPERATING INSTRUCTIONS

A. In addition to submittal for approval, furnish to the Owner's Representative six (6) copies of the items listed below for all equipment and material furnished under this specification.

B. Each approved shop drawing, including all final comments, shall be folded down so that it can be placed in a loose leaf binder of the size using standard 8-1/2" x 11" paper. The drawings shall be folded in a manner that they can be fully opened without removal from the binder.

C. Complete detailed parts lists and/or assembly drawings.

D. All governing agencies' and/or manufacturer's test certificates, permits and inspection reports, insurance inspection and all shop or field performance tests, when required.

E. All operating and maintenance manuals as required by this specification. Such manuals shall be edited to identify equipment furnished.

F. Approved catalog cuts and/or material lists as required by this specification.

G. The Manufacturer's Specification, including tabulation of sizes and identifying numbers for all installed material and equipment. The applicable items in each brochure shall be clearly defined and marked.

H. List of recommended spare parts.

I. All of the above items shall be assembled in books identified for units covered, including all assemblies and components. Each book shall contain Table of Contents page. Forward all the above information except for field test and/or field inspection reports to the Owner's Representative promptly after approval of shop drawings for each item and before delivery of any equipment involved.

1.8 SHIPPING AND PROTECTION INSPECTION

A. All material, equipment and component parts shall be adequately protected to prevent damage, corrosion or entry of foreign matter during shipment, unheated storage or in a dusty atmosphere.

B. Each packing crate and carton containing components shall be visibly stenciled, clearly identifying contents as to the type(s) of unit(s) contained therein and the related equipment assembly or assemblies.

C. Each shipment shall contain packing slip listing all components.

D. For handling during shipment, lifting irons, eye bolts, or other lifting aids shall be bolted to the housing and shall not be removed until the equipment is in final position. The shipping sections may consist of completely assembled structures or sections of one or more units, as required to suit the handling facilities and to facilitate installation. Wiring that extends between sections to be terminated at accessible terminal blocks with wiring harnesses to facilitate field interconnections. Clearly identify all conductors and terminals.

1.9 SERVICE CONDITIONS

A. The material covered by this specification shall be designed for operation under conditions where the altitude does not exceed 3300 feet and the temperature of the cooling air does not exceed 40 Degrees C. maximum, 30 Degrees C. average, unless otherwise specified.

1.10 GUARANTEE-WARRANTY

A. Guarantee that all equipment meets the design and performance requirements specified and alter and/or replace, at no costs to the Owner, any piece of equipment which fails to meet these requirements. This shall include any field work and factory trained supervision necessary.

B. All material included herein shall be free from defects and warranted for a period of 18 months from date of shipment of material from factory or 12 months from date of installation. Any parts found defective due to manufacture shall be replaced and reinstalled at no expense to the owner.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Scope

1. This part of the Specification covers the basic equipment and detailed construction requirements, and the required shop drawings to be submitted for the switchboard. All components, electric interconnections and accessories shall be designed and constructed in accordance with the latest applicable standards as recommended by the American National Standards Institute (ANSI), the National Electrical Manufacturers' Association (NEMA), the Institute of Electrical and Electronics Engineers (IEEE), the Underwriter's Laboratory (UL) as well as the construction details specified herein. In case of conflict between the aforementioned Standards and this Specification, the more stringent requirement shall apply.

2. Applicable requirements of all Local Codes shall also be complied with.

3. Switchboards shall conform to the following standards:

   a. Underwriters Laboratories (UL) -
   UL 891 - "Dead Front Electrical Switchboards".
   Switchboards and its components shall be UL listed and labeled.

   b. National Electrical Manufacturers Association
   NEMA-PB2 - "Dead Front Distribution Switchboards".
   NEMA-PB2.1 - General Instructions for proper handling, installation, operation, and maintenance of dead front distribution switchboards rated 600 volts or less.

4. The general arrangements, limiting dimensions, type and/or ratings are shown on the drawings accompanying this Specification. The basic equipment and detailed construction requirements for the various components entering into individual switchboards, shall be in accordance with the applicable provisions of this part. Coordinate the requirements of the various Parts of this Specification with the drawings when ordering equipment or material in accordance with the applicable provisions of this Part.

2.2 REQUIRED SHOP DRAWINGS

A. Shop drawings shall be submitted as specified in Part 1 - General. As a minimum the following drawings shall be submitted for approval in accordance with the procedure indicated, falling into two categories.

B. Drawings for Preliminary Approval to enable Supplier to proceed with equipment ordering and scheduling of fabrication:

1. Front elevation, one line diagram showing main and branch circuit breaker ratings and types and any information required for complete identification and location of major equipment items, including dimension outline sizes, weights, shipping splits, and arrangement of all equipment.

2. Voltage, phase, frequency, horizontal and vertical bus capacities, short circuit ratings.

3. Floor plan and top view showing materials, sizes, anchoring, location of power and control conduit, and ground cable entries above and below.

4. Preliminary Bill of Material or switchboard summary showing all major components.

5. Preliminary schematic diagrams of nonstandard circuits.

C. Detailed Engineering Drawings supplied to Owner promptly after approval of preliminary drawings.

1. Wiring and schematic diagrams of all power circuits. Wiring diagrams shall be separate from schematic diagrams and shall show equipment arrangement, terminal numbers and point-to-point wiring of each piece of equipment and terminal block. Interconnection wiring diagram shall be furnished, showing general physical arrangement of all units and terminal blocks used in wiring between such units. The separate schematic diagrams shall include complete three line diagrams for buses, low-voltage switch and fuse units and any other devices in this Switchboard.

2. Complete Bill of Material, or switchboard summary showing all components and materials, clearly describing same and providing numbers and data for checking.

3. Detailed sections through all frames showing equipment, buswork, bus phasing connections (l)and ground stud assembly on bus.

4. Detailed drawings showing provision for main and feeder bus extension and bus risers and indication of short circuit bracing.

5. Handling, installation and assembly drawing.

6. Final dimensioned outline drawings and accessories, phasing, location of jacking points, etc.

7. Device connection diagrams.

8. Nameplate data sheets.

9. Cable lug type, quantities and sizes.

10. Operating and maintenance instruction manuals for all types of equipment.

2.3 LIMITING DIMENSIONS

A. The dimensions indicated on the drawings are limiting and the orientation of the equipment shall be maintained. If a particular manufacturer's equipment exceeds any of the dimensions shown, it should be clearly stated in his proposal. The Owner will evaluate the cost of accommodating this equipment in the building design when reviewing his bid.

2.4 600 CLASS METAL-ENCLOSED SWITCHBOARD

A. General

1. Switchboard shall be indoor, free-standing, bolt-on circuit breaker type, group mounted, front accessible only, front and rear aligned and suitable for mounting against a wall, complete with all disconnects and accessories as shown on the drawings and specified herein.
2. Switchboards and buswork shall be fabricated to permit future expansion.
3. Where spaces for future circuit breaker units are shown, provide all current carrying components and covers, ready to receive the future units.
4. Provide nameplates for all units.

B. Enclosure

1. The entire assembly shall be totally metal enclosed, of indoor construction unless otherwise noted. Enclosures shall be fabricated of code gauge steel, formed and framed for rigidity. Fixed panels and framework shall be of bolted construction. Assembly shall be 90 inches high unless conditions require otherwise.
2. Cable compartments shall have adequate space for cables as required. Provide cable supports for each vertical section.
3. Housing shall be thoroughly cleaned and degreased after fabrication, bonderized and primed with zinc chromate. Finish shall be two coats of gray enamel, ANSI #61.

C. Buswork

1. Buswork shall be 3-phase, 4-wire fabricated of copper, tin or silver plated throughout extending the entire length of the assembly, ampere rating as shown on the drawings.

2. Main buswork shall have full capacity throughout the entire length of the switchboard. Vertical buswork shall be equal in size to the sum of the switch sizes in the vertical section including spares and spaces with a maximum size equal to that of the main bus. Bus extensions to feeder switches and from the load side of the switches to the cable compartment shall be equal to the size of the switch. The continuous current ratings of the busses shall be determined by temperature rise as limited by ANSI standards and the National Electrical Code. Neutral bus shall be full sized, rating scale as the phase busses.

3. Provide an A-B-C bus arrangement, left to right, top to bottom, front to back, throughout as viewed from the front of the switchboard.

4. Buswork shall be braced and supported to safely withstand short circuit stresses equal to the full available fault currents at the switchboard, minimum 100,000 AIC ampere RMS symmetrical.

5. Provide two-hole long barrel compression cable connectors for cable as indicated per phase, neutral and ground on all incoming conductors.

6. Provide bus tap lugs for connection of transient voltage surge suppressors as close to incoming conductors as possible.

7. Ground bus shall be rated 25 percent of the phase busses with minimum size of 3 inches by 1/4 inch and be continuous for the entire length of the switchboard. Ground bus shall be accessible from the front of the switchboard. Ground bus shall be copper.

D. Circuit Breaker - Provide thermal magnetic circuit breakers with interrupting capacity as shown on the Drawing. Where indicated on distribution schedule on drawing, provide circuit breakers with electronic trip units.

E. Accessories

1. The following accessories shall be furnished with each switchboard.

a. One (1) quart of touchup paint.

b. One set of special wrenches, removable hand cranks, tools as required to maintain and disassemble parts of the switchgear for field maintenance.

F. Approved Manufactures

1. The 600 volt class metal-enclosed switchboard shall match existing board from Precision Switchboard.

PART 3 - EXECUTION

3.1 SHIPMENT

A. Prior to shipment, all equipment shall be cleaned. All openings shall be covered to prevent entrance of foreign material. Where necessary, desiccant bags shall be located within cabinets to provide a minimum of 3 months protection.

B. Equipment shall be shipped in sections to facilitate installation, complete with all accessories required for assembly. All wiring that extends between sections shall terminate on terminal blocks at the interface points, with a wiring harness (with framing strips) that will be field installed between adjacent sections. All terminal and wires shall be clearly marked with wire numbers.

3.2 INSTALLATION

A. General: Install and connect switchboard equipment in accordance with approved manufacturer's shop drawings including supplemental devices required to make each unit a complete installation.

B. Switchboards shall be anchored to two (2) 3-inch channel sills set flush with the concrete housekeeping pad. Provide all required shims, etc., to achieve a level installation.

C. Mechanical Connections

1. Make all required connections including split line connections.

2. Remove shipping irons after equipment is set in place.

D. Electrical Connections

1. Bus connections: Use manufacturer's recommended torque.

2. Install control wiring connections at shipping splits and coordinate with SCADA requirements for Emergency Switchboards.

3. Provide holes in plates to allow for required conduit connections.

4. Terminate low voltage cables.

5. Ground conduits and cables as specified in Section 26 0200 and 26 0300.

6. Insulating Tape: When main buses are insulated or enclosed by barriers, insulate with tape wrappings all cable connections for voltage level involved so no current carrying parts are exposed.

7. Cable Blocks: Support all outgoing secondary cables from cable blocks.

3.3 FIELD QUALITY CONTROL

A. Phase Sequence

1. Coordinate with the system supply for proper phase sequence throughout.

2. Provide phase sequence indicator on jobsite to verify all secondary outgoing feeder rotation.

B. Test all circuit breakers or fuses and switches for proper operation.

C. Bus Bar Connections

1. Check for proper resistance values using "Ducter" low resistance ohmmeter. Make adjustments where valves exceed manufacturer's recommendations.

2. "Megger" phase bus bars to assure that no grounds or shorts are present. Disconnect potential and control transformers, instrument fuses and other equipment which may cause false readings.

D. Start-Up and Acceptance

1. Coordinate with equipment supplier and Owner for preparatory work required prior to energizing and acceptance and in accordance with Owner's start-up procedures.

E. Contractor shall leave the entire installation in perfect working order.

F. Provide U.L. listing. Contractor shall hire as part of his contract a UL field engineering service member to re-certify the new bus tap in the existing distribution board is not in violation of the UL listing and meets UL listing requirements.

END OF SECTION

SECTION 26 0775

PACKAGED ENGINE GENERATOR SYSTEM – DIESEL OUTDOOR

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
2. IEEE446 B Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
3. NFPA37 B
4. NFPA70 B National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
5. NFPA99 B Essential Electrical Systems for Health Care Facilities.
6. NFPA110 B Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
2. UL142 B Sub-base Tanks.
3. UL1236 B Battery Chargers.
4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 B M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility B Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. FCC Part 15, Subpart B.
5. IEC8528 part 4. Control Systems for Generator Sets.
6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
8. UL1236 BBattery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.2 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.

B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.

C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.

D. Manufacturers Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Manufacturers Certificate: Certify that Products meet or exceed specified requirements.

F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.3 OPERATION AND MAINTENANCE

A. Manuals: Furnish four (4) Operation and Maintenance manuals.

B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.4 QUALITY ASSURANCE

A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:
   1. Prototype model tests
   2. Fully assembled factory production model tests
   3. Field acceptance tests

B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory Production tested as described herein shall not be acceptable.

C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer=s standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.

D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.

E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.

F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer=s standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.

I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.

J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (122 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.

K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.

M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, a two (2) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The equipment supplier at their expense shall coordinate and provide all transportation and lodging for the owner and Owner's engineering representatives, minimum of four to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.

N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 450 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.

O. Testing Procedure

1. Test diesel-alternator unit at 0.8 PF in the following sequence:
2. 0.5 hour at 1/4 load.
3. 0.5 hours at 1/2 load.
4. 0.5 hours at 3/4 load.
5. 0.5 hours at full load.

P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:

1. Barometric Pressure.
2. Intake Air Pressure.
3. RPM.
4. Output voltage per phase.
5. Output amperes per phase.
6. Power Factor.
7. KW.
8. Winding temperature.
9. Transient response testing sequence:
10. 0-25%, 25%-0.
11. 0-50%, 50%-0.
12. 0-75%, 75%-0.
13. 0-100%, 100%-0.

Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.

R. Field Acceptance Tests: Generator supplier shall provide and conduct a four (4) hour load bank test at unity power factor for the generator set. Contractor must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

S. Initial start up and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Contractor responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.

T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.

B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.

B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.9 EXTRA MATERIALS

A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.10 WARRANTY

A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.11 SERVICE AGREEMENT

A. Manufacturer shall provide Owner with a One (1) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturer

1. Cummins Power Generation, model C10D6 rated for STANDBY POWER with BB93 Frame Alternator as distributed by Cummins Power Systems, LLC, 890 Zerega Avenue, Bronx, NY 10473. Contact Ed Cheung: 718-892-2400, ext. 217.

2. Approved substitute, meeting specifications: Caterpillar.

B. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.2 DIESEL ENGINE-GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 208 Volts AC, 3-phase, 4-wire, 60 hertz.

2. The generator set shall be rated at 10 kW, 12.5 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 131 degrees F (55 degrees C).

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of 75 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.
6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices with required protection located at a wall-mounted common distribution panel, if walk-in enclosure.

3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.3 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be diesel, minimum EPA TIER 4i, 4 cycle, radiator and fan cooled. Minimum displacement shall be 100.5 cubic inches, with 3 cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.

B. A digital electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

C. Skid-mounted radiator and cooling system rated for full load operation in 131 degrees F (55 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.4 ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:

1. Positive displacement, contact.
2. Mechanical, full pressure, lubrication oil pump.
3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.
5. Replaceable dry element air cleaner with restriction indicator.
6. Flexible supply and return fuel lines.
7. Engine mounted battery charging alternator, 40-ampere minimum and solid-state voltage regulator.

B. Coolant Heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

4. The coolant heater(s) shall be 240V, 4500 watts and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

C. Provide vibration isolators, internal pad type, and quantity as recommended by the generator set manufacturer.

D. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade installed inside enclosure.

F. A UL listed/CSA certified 15 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger shall be located inside the automatic transfer switch. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:
1. Loss of AC power - red light
2. Low battery voltage - red light
3. High battery voltage - red light
4. Power ON - green light (no relay contact)

2.5 AC ALTERNATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. The subtransient reactance of the alternator shall not exceed 10 percent, based on the 80C rise rating.

D. Alternator shall be rated for a minimum of 18 KW at a 105C, 120/208 VAC standby.

2.6 ENGINE GENERATOR SET CONTROL

A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches

1. MODE SELECT Switch: The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.

2. EMERGENCY STOP switch: Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.

3. RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering: The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.
3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:
   a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
   b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
   c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
   d. The control shall include an amber common warning indication lamp.

2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
   - low oil pressure (warning)
   - low oil pressure (shutdown)
   - oil pressure sender failure (warning)
   - low coolant temperature (warning)
   - high coolant temperature (warning)
   - high coolant temperature (shutdown)
   - high oil temperature (warning)
   - engine temperature sender failure (warning)
   - low coolant level (warning)
   - fail to crank (shutdown)
   - fail to start/overcrank (shutdown)
   - overspeed (shutdown)
   - low DC voltage (warning)
   - high DC voltage (warning)
   - weak battery (warning)
   - low fuel-daytank (warning)
   - high AC voltage (shutdown)
   - low AC voltage (shutdown)
   - under frequency (shutdown)
   - over current (warning)
   - over current (shutdown)
   - short circuit (shutdown)
   - ground fault (warning) (optional-when required by code or specified)
   - over load (warning)
   - emergency stop (shutdown)
   - (4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

F. Engine Status Monitoring

1. The following information shall be available from a digital status panel on the generator set control:

   - engine oil pressure (psi or kPA)
   - engine coolant temperature (degrees F or C)
   - engine oil temperature (degrees F or C)
   - engine speed (rpm)
   - number of hours of operation (hours)
   - number of start attempts
   - battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

3. Provide and install a 20-light LED type remote alarm annunciator with horn, located as shown on the Drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

4. The annunciator shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Genset Supplying Load	Amber	No
Charger AC Failure	Amber	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Red	Yes
Check Genset	Amber	No
Not In Auto	Red	Yes
Genset Running	Amber	No
High Battery Voltage	Amber	Yes
Low Battery Voltage	Red	Yes
Weak Battery	Red	Yes
Fail to Start	Red	Yes
Low Coolant Temperature	Red	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Red	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
(4) Spares	Configurable	Configurable

2.7 ENGINE CONTROL FUNCTIONS

A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.

C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

2.8 ALTERNATOR CONTROL FUNCTIONS

A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

2.9 OTHER CONTROL FUNCTIONS

A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10 GENERATOR MAIN LINE CIRCUIT BREAKER

A. The generator set shall be provided with a mounted 40 amp main line rated circuit breaker. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

2.11 SUBBASE FUEL TANK (24 hours @ 100% load)

A. Provide a C319 sub-base nominal 46 gallon fuel tank for the generator set. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:

1. Emergency tank and basin vents.
2. Mechanical level gauge.
3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.
4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.
5. Low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.
6. Basin drain.
7. Integral lifting provisions.
8. Refer to contract drawings for additional acc's and controls as required.

2.12 OUTDOOR SOUND ENCLOSURE

A. Construction

1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure

a. Package shall comply with the requirements of the NEC for all wiring materials and components.

b. Sound attenuation rating of 65 dBA @ 7m.

c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 131 F.

B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a nominal 46 Gallon fuel tank base, incorporating prepainted steel construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed to provide the specified level of sound attenuation.

C. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.

D. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure with internal drain valves.

E. External radiator fill provision must be provided.

F. Doors shall be recessed, lockable with retainers to hold doors open for easy access.

PART 3 - EXECUTION

3.1 ACCEPTANCE

A. Equipment shall be initially started and operated by representatives of the manufacturer.

B. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

3.2 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility owner.

3.3 DEMONSTRATION

A. Provide systems demonstration. Electric Contractor shall provide fuel for testing and shall fill tank complete after all testing is done and before turning over to Owner.

B. Describe loads connected to standby system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 26 0780

TRANSFER SWITCH

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SCOPE

A. Provide complete factory assembled power transfer equipment with digital electronic controls designed for surge voltage isolation, and including voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts.

B. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for all the products provided. Technicians specifically trained to support the product and employed by the generator set supplier shall service the transfer switches.

1.2 CODES AND STANDARDS

A. The automatic transfer switch shall conform to the requirements of the following codes and standards:

1. UL1008. The transfer switch shall be UL listed and labeled.
2. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
3. CSA 282, Emergency Electrical Power Supply for Buildings
4. EN55011, Class B Radiated Emissions
5. EN55011, Class B Conducted Emissions
6. IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity. Similar waveforms are described in ANSI/IEEE 62.41-1991
7. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
8. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
9. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
10. IEC 1000-4-6 Conducted Field Immunity
11. IEC 1000-4-11 Voltage Dip Immunity
12. NFPA20 – Fire Pumps. Transfer switches serving fire pumps shall be specifically listed and labeled for that application.
13. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
14. NFPA99 – Essential Electrical Systems for Health Care Facilities
15. NFPA110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems.
16. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
17. NEMA ICS10-1993 – AC Automatic Transfer Switches.

1.3 ACCEPTABLE MANUFACTURERS

A. Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on microprocessor-based transfer switches manufactured by Cummins as distributed by Cummins Power Systems LLC. Basis of Design: Cummins model OTPC.

PART 2 - PRODUCTS

2.1 POWER TRANSFER SWITCH

A. Rating: As noted in contract drawings.

B. Main contacts shall be rated for 600 Volts AC minimum.

C. Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000M).

D. Transfer switch equipment shall have withstood and have closing ratings (WCR) in RMS symmetrical amperes greater than the available fault currents shown on the drawings. The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be third party listed and labeled for use with the specific protective device(s) installed in the application.

2.2 CONSTRUCTION

A. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the source 1 and source 2 positions. The transfer switch shall be specifically designed to transfer to the best available source if it inadvertently stops in a neutral position.

B. Transfer switches rated through 1000 amperes shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact mechanisms. Transfer switches over 1000 amperes shall be equipped with manual operators for service use only under de-energized conditions.

C. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.

D. Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism.

E. Transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with line voltage components.

F. Transfer switches that are designated on the drawings as 3-pole shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating.

2.3 CONNECTIONS

A. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.

B. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the generator set.

2.4 TRANSFER SWITCH CONTROL

A. Operator Panel Transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions. The operator panel shall be provided with the following features and capabilities.

B. High intensity LED lamps to indicate the source that the load is connected to (source 1 or source 2); and which source(s) are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control.

C. High intensity LED lamps to indicate that the transfer switch is "not in auto" (due to control being disabled or due to bypass switch enabled or in operation) and "Test/Exercise Active" to indicate that the control system is testing or exercising the generator set.

D. "OVERRIDE" pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation.

E. "TEST" pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load.

F. "RESET/LAMP TEST" pushbutton that will clear any faults present in the control, or simultaneously test all lamps on the panel by lighting them.

G. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via the service tool or an operator display panel.

H. Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen for easy viewing of voltage balance.

I. Display source status, to indicate source is connected or not connected.

J. Display load data, including 3-phase AC voltage, 3-phase AC current, frequency, KW, KVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.

K. The display panel shall allow the operator to view and make the following adjustments in the control system, after entering an access code:

1. Set nominal voltage and frequency for the transfer switch.
2. Adjust voltage and frequency sensor operation set points.
3. Set up time clock functions.
4. Set up load sequence functions.
5. Enable or disable control functions in the transfer switch, including program transition.
6. Set up exercise and load test operation conditions, as well as normal system time delays for transfer time, time delay start, stop, transfer, and retransfer.

L. Display Real time Clock data, including date, and time in hours, minutes, and seconds. The real time clock shall be "Year 2000" compliant and incorporate provisions for automatic daylight savings time and leap year adjustments. The control shall also log total operating hours for the control system.

M. Display service history for the transfer switch. Display source connected hours, to indicate the total number of hours connected to each source. Display number of times transferred, and total number of times each source has failed.

N. Display information for other transfer switches in the system, including transfer switch name, real time load in KW on the transfer switch, current source condition, and current operating mode.

O. Display fault history on the transfer switch, including condition, and date and time of fault. Faults to include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, battery charger malfunction, network battery voltage low, and network communications error.

2.5 INTERNAL CONTROLS

A. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600VAC. Provide RMS voltage sensing and metering that is accurate to within plus or minus 1% of nominal voltage level. Frequency sensing shall be accurate to within plus or minus 0.2%. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions are not acceptable.

B. Transfer switch voltage sensors shall be close differential type, providing source availability information to the control system based on the following functions:

C. Monitoring all phases of the normal service (source 1) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of normal voltage level).

D. Monitoring all phases of the emergency service (source 2) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of pickup voltage level).

E. All transfer switch sensing shall be configurable from a Windows 95 or NT PC-based service tool, to allow setting of levels, and enabling or disabling of features and functions. Selected functions including voltage sensing levels and time delays shall be configurable using the operator panel. Designs utilizing DIP switches or other electromechanical devices are not acceptable. The transfer control shall incorporate a series of diagnostic LED lamps.

F. The transfer switch shall be configurable to control the operation time from source to source (program transition operation). The control system shall be capable of enabling or disabling this feature, and adjusting the time period to a specific value. A phase band monitor or similar device is not an acceptable alternate for this feature.

G. The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0-15 seconds); transfer (adjustable in a range from 0-120 seconds); retransfer (adjustable in a range from 0-30 minutes); and generator stop (cooldown) (adjustable in a range of 0-30 minutes).

H. The control system shall be designed and prototype tested for operation in ambient temperatures from -40C to +70C. It shall be designed and tested to comply with the requirements of the following voltage and RFI/EMI standards.

I. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.

2.6 CONTROL INTERFACE

A. The transfer switch will provide an isolated relay contact for starting of a generator set. The relay shall be normally held open, and close to start the generator set. Output contacts shall be form C, for compatibility with any generator set.

B. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.

2.7 ENCLOSURE

A. Enclosures shall be UL listed. The enclosure shall provide NEC wire bend space. The cabinet door shall be key-locking.

B. Transfer switches shall be mounted in enclosures of the type NEMA

C. The cabinet shall provide code-required wire bend space at point of entry as shown on the drawings. Manual operating handles and all control switches (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking cabinet door. Transfer switches with manual operating handles and/or non key-operated control switches located on outside of cabinet do not meet this specification and are not acceptable.

2.8 ACCESSORIES

A. Provide exerciser clock.

B. Internal factory mounted and wired 15 amp battery charger.

END OF SECTION

SECTION 26 0785

LIGHTNING PROTECTION

PART 1 - GENERAL

Applicable provisions of the conditions of the Contract and Division 1 General Requirements govern the work in this section. Submit shop drawings for checking and approval.

1.1 SCOPE

A. Provide a complete Lightning Protection System in accordance with these specifications and all applicable codes.

1.2 CODE AND STANDARDS REQUIREMENTS

A. The following specifications and standards shall form a part of this specification.

1. Underwriter's Laboratories, Inc. Subject 96A Eleventh Edition (2001) or latest.

2. National Fire Protection Association NFPA No. 780 (2008) or latest.

3. Transient Voltage Surge Suppression, UL1449 Third Edition (2009) or latest.

1.3 STANDARD PRODUCTS

A. The system provided under this specification shall be the product of a single manufacturer regularly engaged in the production of Lightning Protection Systems, shall be the manufacturer's latest designs, and shall be listed by Underwriters Laboratories Standard for Lightning Protection Components – UL96, Fifth Edition (2005) or latest.

B. Contractor shall acquire the services of the manufacturer's Engineering Department for Coordination and Design of this system.

1.4 SYSTEM DESCRIPTION

A. The exterior lightning protection system shall consist of an air termination system (interception points), ground termination system (dissipation points), and a down conductor system (low impedance conductors interconnecting the interception and dissipation points).

B. The interior lightning protection system shall consist of ground potential loop conductors, bonding conductors and devices required to achieve an equalization of earth (ground) potential between the various grounded metal objects and systems within the building.

1.5 SUPPLEMENTAL SUBMITTALS

A. Contractor shall provide detailed shop drawings to show locations of system components including connections to other building systems and components. These Drawings shall be submitted for approval prior to the start of any work and shall be coordinated with applicable trades.

B. Provide complete list of materials and catalog data.

C. Test Report.

D. Certificate of compliance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Harger Lightning Protection, Inc.
Libertyville, IL
800-842-7437

B. Robbins Lightning, Inc.
Maryville, MO
816-582-3156

C. East Coast Lightning Equipment, Inc
Winsted, CT
860-379-9072

D. Thompson Lighting
ST Paul, MN
800-777-1230

E. ERICO Manufacturing
Solon, Ohio
800-777-1230

2.2 INSTALLERS

A. Approved Lightning Protection, Co. Inc.
65 Mahan Street
West Babylon, NY 11704
(631) 643-6327

B. Associated Lightning Rod Co. Inc.
Millerton, NY 12546
518-789-4603

2.3 MATERIALS

A. All materials shall be of either copper/brass or aluminum materials.

B. Materials shall be sized in accordance with the material requirements of NFPA780 and UL96A. Class I materials shall be used for systems on structures not exceeding 75 feet in height and Class II materials shall be used for systems on structures exceeding 75 feet above grade.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Air Terminals

1. Air terminals shall be provided so as to enclose the entire building within a zone of protection. Air terminals shall project a minimum of ten inches above the area protected and shall be located at intervals not exceeding 20'-0" along ridges and around the perimeter of flat or gently sloping roofs. Flat or gently sloping roofs exceeding 50'-0" in width shall be protected with additional air terminals located at intervals not exceeding 50'-0" in the flat or gently sloping area. Air terminals shall be located within 18 inches of roof edges and outside corners of protected areas. Air terminal spacings exceeding these dimensions are permitted so long as the area protected lies within a zone of protection.

2. Air terminals shall be installed for stacks, flues, mechanical equipment, and other objects not located within a zone of protection. Non-metallic objects or metal objects having a metal thickness of less than 3/16" require the installation of air terminals and required conductors. Objects having a metal thickness 3/16" or greater shall be connected to the lightning protection system per standard requirements using main size conductor and connector fittings having 8 square inches of surface contact area.

3. Air terminal mounting bases shall be of cast construction and securely fastened to the structure in accordance with standard requirements.

B. Conductors

1. Main conductors shall be sized in accordance with the material requirements above and shall provide a two-way path from each air terminal horizontally or downward to connections with ground terminals. Conductors shall be free of excessive splices and sharp bends. No bend of a conductor shall form an included angle of less than 90° nor have a radius of bend of less than 8". Conductors shall be secured to the structure at intervals not exceeding 3'-0".

2. Down conductors shall be aluminum and shall be concealed in the exterior wall construction. Down conductors shall be spaced at intervals averaging not more than 100' around the perimeter of the structure. In no case shall a structure have fewer than two down conductors.

3. In the case of structural steel frame construction, down conductors shall be omitted and roof conductors shall be connected to the structural steel frame at intervals averaging not more than 60' around the perimeter of the structure. Connections to the steel frame shall be made with bonding plates having 8 square inches of contact or by exothermic weld connections at both the top and bottom of the column.

C. Roof Penetrations

Roof penetrations required for down conductors or for connections to structural steel framework shall be made using thru-roof assemblies via 1" PVC conduit sleeves that are rated for exterior use**,** with solid bars and appropriate roof flashings. Conductors shall not pass directly through the roof. Roof flashings compatible with the roofing system shall be provided by the roofing contractor.

D. Common Grounding

1. Common grounding of all ground mediums within the building shall be ensured by interconnecting the lightning protection system with main size conductors and fittings to the cold water ground. Metal bodies located within 6' of the lightning protection system shall be bonded to the system as per UL 96A standard.

2. Ground Terminations

Ground terminations shall be provided for each down conductor and shall consist of 3/4" x 10'-0" (minimum) copper-clad ground rod. The down conductor shall be connected to the ground rod using a bronze ground rod clamp having at least 1½" of contact between the rod and the conductor, measured parallel to the axis of the rod, or by an exothermic weld connection. Ground rods shall be located 2'-6" below grade, 2' from the foundation wall and shall extend a minimum of 10' vertically into the earth. Conductors from the grounded connections to the ground termination shall be Class II copper lightning conductors.

E. Surge Protection

Secondary surge protection devices meeting UL 1449 requirements for Master Label Lighting Systems shall be provided on each electric and telephone service entrance, Cable TV Service and all antenna lead-in cables.

F. Test and Acceptance
Contractor shall perform continuity, resistance and additional tests as recommended by the manufacturer, and or requested by the Authority.

G. Certification
Upon completion of the installation the Contractor shall furnish the Master Label Certificate issued by Underwriters Laboratories, Inc. for this system. If the protected structure is an addition to or is attached to an existing structure that does not have a lightning protection system, the Contractor shall certify that the system installed complies with UL requirements and advise the Owner of the lightning protection work required on the existing structure to obtain the Master Label. If the existing structure does have a lightning protection system, the Contractor shall advise the Owner of any additional work required on the existing system to bring it into compliance with current UL requirements and thus qualify for the Master Label Certificate of Underwriters Laboratories, Inc.

END OF SECTION

SECTION 26 0800

ADDRESSABLE FIRE PROTECTIVE SIGNALING SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION

A. At the time of bid, all exceptions taken to these Specifications, all variances from these Specification and all substitutions of operating capabilities or equipment called for in these Specification shall be listed in writing and forwarded to the Engineer. Any such exception, variances or substitutions which were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment.

B. The entire system shall be installed with aesthetics in mind. All control panels and remote annunciators installed in public spaces shall be semi-flush mounted with no exposed conduit or cable trays.

C. Non-coded, UL Listed intelligent analog addressable system, one-way voice communications with multiplexed signal transmission and survivable network nodes. The entire system shall be UL2572 Listed Mass Notification System and IP network.

D. Speaker Strobes locations shall include a speaker and a clear “FIRE” labeled strobe to be added to a fire alarm speaker strobe component. Edwards model G4E series or equal.

E. All remote local operating console (remote annunciator/LOC) shall have LCD display, paging microphone, audio zone selection switches and by-pass switches. Provide visual indication which microphone is active during paging operations. During local microphone paging the speakers located near by the microphone shall be muted through software programmable audio control relays. The LOC shall not override the Command Center operations.

F. Command Center or Local Operator Console (LOC) with redundant audio messages, paging microphone and request for control switches & status indicators. Each Command Center shall have switches with LED annunciating control and requesting control as follows:

1. Request Take Control
2. Request Accepted
3. Request Deny
4. Restore command center to normal operation
5. Priority request override Take Control

1.2 WORK INCLUDED

A. The work covered by this Section of the Specification shall include all labor, equipment, materials and services to furnish and install a complete fire alarm system of the addressable, non-coded type. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using a plug-in programmer. The system shall consist of, but not be limited to, the following:

1. Fire Alarm Control Panel and related remote data gathering panels.
2. Remote Annunciators with semi flush backbox.
3. Addressable manual fire alarm stations.
4. Addressable analog area smoke detectors.

5. Addressable analog duct smoke detectors.
6. Addressable analog heat detectors.
7. Magnetic door\card access release override control.
8. Audible notification appliances - Speakers.
9. Visual notification appliances - strobes.
10. Central station alarm connection control.
11. Air handling systems shutdown control.
12. Magnetic door holder release.
13. Dry pipe sprinkler release valve/deluge valve control.
14. Sprinkler supervisory switches and tamper switch supervision.
15. Battery standby.
16. Kitchen Ansul System Monitoring

1.3 APPLICABLE CODES AND STANDARDS

A. All equipment shall be UL listed for its intended use and conform to the latest UL Standards.

B. Underwriters Laboratories Inc.: The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

1.	UL 864/UOJZ, APOU	Control Units for Fire Protective Signaling Systems.
2.	UL 268	Smoke Detectors for Fire Protective Signaling Systems.
3.	UL 268A	Smoke Detectors for Duct Applications.
4.	UL 217	Smoke Detectors Single Station.
5.	UL 521	Heat Detectors for Fire Protective Signaling Systems.
6.	UL 228	Door Holders for Fire Protective Signaling Systems.
7.	UL 464	Audible Signaling Appliances.
8.	UL 1638	Visual Signaling Appliances.
9.	UL 38	Manually Activated Signaling Boxes.
10.	UL 346	Waterflow Indicators for Fire Protective Signaling Systems.
11.	UL 1971	Standard for Signaling Devices for the Hearing Impaired
12.	UL 1481	Power Supplies for Fire Protective Signaling Systems.
13.	UL 1711	Amplifiers for Fire Protective Signaling Systems.
14.	UUKL	The Fire Alarm system shall be UUKL for Smoke Control.

C. This installation shall comply with:

1. Americans with Disabilities Act (ADA)
2. National Electric Code, Article 760.
3. National Fire Protection Association Standards: NFPA72
4. Local and State Building Codes and the Local Authorities Having Jurisdiction.
5. International Standards Organization (ISO): ISO-9001

1.4 RELATED DOCUMENTS

A. Secure permits and approvals prior to installation.

B. Prior to commencement and after completion of work notify Authorities Having Jurisdiction.

C. Submit letter of approval for installation before requesting acceptance of system.

1.5 RELATED WORK

A. The Contractor shall coordinate work in this Section with all related trades. Work and/or equipment provided in other Sections and related to the fire alarm system shall include, but not be limited to:

1. Sprinkler waterflow and supervisory switches shall be furnished and installed by the fire protection contractor but wired and connected by the electrical contractor. Modification of existing sprinkler devices to accommodate monitoring by the new fire alarm system shall be the responsibility of the fire alarm system installing contractor.

2. Duct smoke detectors shall be furnished, wired and connected by the electrical contractor. The HVAC contractor shall furnish necessary duct opening to install the duct smoke detectors.

3. New air handling and smoke exhaust system fan control circuits and status contacts to be furnished by the HVAC control equipment.

4. Elevator recall control circuits to be provided by the elevator control equipment. Modifications to the existing elevator controls to accommodate ANSI A17.1 shunt trip activation shall be provided by the elevator controls contractor. Any shunt trip circuit breakers and related wiring required for ANSI A17.1 compliance shall be provided by the electrical contractor (see power riser for more details).

5. Kitchen hood extinguishing systems status monitoring.

6. Fire pumps (manual, automatic and special service) status monitoring.
   a. Pump failure (fail to start) indication
   b. Pump running indication
   c. Phase reversal indication

7. Emergency generator status monitoring.
   a. Running indication
   b. Fail to start indication

8. Conduit: Division 26.

9. Wire and Cables: Division 26.

10. Re-use existing two (2) dedicated outgoing RJ-31X telephone lines that currently are connected to existing F.A.C.P. Extend phone lines as required and necessary. It shall be the responsibility of the Installing **Electrical Contractor**. Establishment of central station monitoring account shall be the responsibility of the fire alarm equipment vendor.

1.6 SUBMITTALS

A. Provide list of all types of equipment and components provided. This shall be incorporated as part of a Table of Contents, which will also indicate the manufacturer's part number, the description of the part, and the part number of the manufacturer's product datasheet on which the information can be found.

B. Provide description of operation of the system (Sequence of Operation), similar to that provided in Part 2 of this Section of the Specifications, to include any and all exceptions, variances or substitutions listed at the time of bid. Any such exceptions, variances or substitutions which were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment. The sequence of operation shall be project specific and shall provide individual sequences for every type of alarm, supervisory, or trouble condition, which may occur as part of normal or off-normal system use.

C. Provide manufacturer's ORIGINAL printed product data, catalog cuts and description of any special installation procedures. Photocopied and/or illegible product data sheets shall not be acceptable. All product datasheets shall be highlighted or stamped with arrows to indicate the specific components being submitted for approval.

D. Provide manufacturer's installation instruction manual for specified system.

E. Provide samples of various items when requested.

F. Provide copy of State License to perform such work.

G. Provide copies of NICET Level II Fire Alarm certifications for the two (2) technicians assigned to this project.

H. Provide shop drawings as follows:

1. Coversheet with project name, address and drawing index.
2. General notes drawing with peripheral device backbox size information, part numbers, device mounting height information, and the names, addresses, point of contact, and telephone numbers of all contract project team members.
3. Device riser diagram that individually depicts all control panels, annunciators, addressable devices, and notification appliances. Shall include a specific, proposed point descriptor above each addressable device. Shall include a specific, discrete point address that shall correspond to addresses depicted on the device layout floor plans. Drawing shall provide wire specifications, and wire tags shown on all conductors depicted on the riser diagram. All circuits shall have designations that shall correspond with those require on the control panel and floor plan drawings. End-of-line resistors (and values) shall be depicted.
4. Control panel termination drawing(s). Shall depict internal component placement and all internal and field termination points. Drawing shall provide a detail indicating where conduit penetrations shall be made, so as to avoid conflicts with internally mounted batteries. For each additional data gathering panel, a separate control panel drawing shall be provided, which clearly indicated the designation, service and location of the control enclosure. End-of-line resistors (and values) shall be depicted.
5. See section 3.04 DOCUMENTATION AND TRAINING for other documents relating to this section.
6. Device typical wiring diagram drawing(s) shall be provided which depict all system components, and their respective field wiring termination points. Wire type, gauge, and jacket shall also be indicated. When an addressable module is used in multiple configurations for monitoring or controlling various types of equipment, different device typical diagrams shall be provided. End-of-line resistors (and values) shall be depicted.
7. Device layout floor plans shall be created for every area served by the fire alarm system. CAD Files (AutoCAD latest version) shall be provided by the consulting engineer for the use of the fire alarm system equipment vendor in the preparation of the floor plans. Floor plans shall indicate accurate locations for all control and peripheral devices. Drawings shall be NO LESS THAN 1/8 INCH SCALE. All addressable devices shall be depicted with a discrete address which corresponds with that indicated on the Riser Diagram. All notification appliances shall also be provided with a circuit address which corresponds to that depicted on the Riser Diagram. If individual floors need to be segmented to accommodate the 1/8" scale requirements, KEY PLANS and BREAK-LINES shall be provided on the plans in an orderly and professional manner. End-of-line resistors (and values) shall be depicted.
8. Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable and notification appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes. The initial submission shall be Revision 0, with Revision A, B, or C as project modifications require.

I. Battery calculations shall be provided on a per power supply/charger basis. These calculations shall clearly indicate the quantity of devices, the device part numbers, the supervisory current draw, the alarm current draw, totals for all categories, and the calculated battery requirements (which reflect a 20% DEGRADE, for 24 Hour supervisory, 15 minute alarm operation). Battery calculations shall also reflect all control panel component, remote annunciator, and auxiliary relay current draws. Failure to provide these calculations shall be grounds for the complete rejection of the submittal package.

J. Table of contents, product data sheets, sequences of operation, battery calculations, installation instructions, licenses, NICET certifications and B-Size (blackline) reduced shop drawings shall be provided by the fire alarm vendor as part of a single, spiral bound submittal book. The submittal book shall have laminated covers indicating the project address, project number, system type, and contractor. The book shall consist of labeled dividers, and shall not exceed 9 ½" in width, and 11 ½" in height. No less than three (3) sets of submittal booklets shall be provided to the consulting engineer for review and comment. Additional copies may be required at no additional cost to the project.

K. Scale drawing sets shall be submitted along with the submittal booklets. These drawings may be either D-Size or E-Size Blueline drawings and of a sufficient resolution to be completely read. Sets shall be bound and folded so that is does not take up more than 100 square inches of space. No less than three (3) sets of scale drawing sets shall be provided to the consulting engineer for review and comment. Additional copies may be required at no additional cost to the project.

1.7 WARRANTY

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance or approval by AHJ. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The catalog numbers used are those of Edwards EST-3 by UTC Fire and Security. Contact for Base Building Fire Alarm: Mike Tano of Open Systems 914-241-0057.

B. If equipment of another manufacturer is to be submitted for approval as equal, the contractor shall, at the time of bid, list all exceptions taken to these Specifications, all variances from these Specifications and all substitutions of operating capabilities or equipment called for in these Specifications and forward said list to the Engineer. Any such exceptions, variances or substitutions that were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment. Final determination of compliance with these Specifications shall rest with the Engineer, who, at his discretion, may require proof of performance.

C. Alternate product submissions made without proof of no less than three (3) factory authorized and certified manufacturer's distributors residing within 50 miles of the project job site shall be rejected. These distributors must not only provide installation support but must have a service organization capable of 24 hour emergency call service and MUST HAVE BEEN CONTRACTED AND DELIVERED NO LESS THAN FIVE (5) ACCEPTED PROJECTS USING THE SUBMITTED PRODUCT OVER THE PAST YEAR.

D. Alternate product submissions based upon use of a product line considered proprietary in its distribution, design, application software, or ongoing maintenance and repair shall not acceptable. Proof of a product's non-proprietary nature shall be the burden of the contractor at the time of Bid and shall be in the form of written documentation. The determination of a product's compliance to this requirement shall be exclusively that of the Consulting Engineer.

E. All products used shall be of a single manufacturer. Submission of notification appliances, auxiliary relays, or documentation from other than a single manufacturer shall not be acceptable and will be grounds for immediate disapproval without comment.

2.2 CIRCUITING GUIDELINES

A. Each addressable analog loop shall be circuited so device loading is not to exceed 80% of loop capacity in order to leave for space for future devices. The loop shall have Class B operation.

B. Where it is necessary to interface conventional initiating devices provide intelligent input modules to supervise Class B zone wiring.

C. Each of the following types of devices or equipment shall be provided with supervised circuits as shown on the drawings but shall be typically as follows:

1. Sprinkler Valve Supervisory Switches: Provide one (1) supervisory module circuit for each sprinkler valve supervisory switch.

2. When waterflow and tamper switches exist at the same location, provide one (1) dual input addressable module. When odd numbers of devices exist at a single location, provide additional single input addressable modules.

D. Each of the following types of alarm notification appliances shall be circuited as shown on the drawings but shall be typically as follows:

1. Audible Signals: Provide sufficient spare capacity to assure that the addition of five (5) audible devices can be supported without the need for addition control components (power supplies, signal circuit modules, amplifiers, batteries, etc.)

2. Visual Signals Provide sufficient spare capacity to assure that the addition of three (3) visual devices can be supported without the need for addition control components (power supplies, signal circuit modules, batteries, etc.)

E. Each of the following types of remote equipment associated with the fire alarm system shall be provided with a form ‘C’ control relay contact as shown on the drawings, but shall be typically as follows:

1. HVAC Fan Systems: Provide one (1) shutdown control relay contact for each HVAC fan system.

2. HVAC Supply Fans: Provide one (1) shutdown control relay contact for each HVAC supply fan.

3. HVAC Return Fans: Provide one (1) shutdown control relay contact for each HVAC return fan.

F. Provide a dedicated 24VDC circuit to feed all auxiliary relays required for inductive loads. Circuits shall be supervised via an end-of-line relay and addressable input module. Auxiliary relays shall not derive their power from the starter or load being controlled.

G. Each control or data gathering panel shall have a dedicated 20Amp-120VAC feed. This feed shall come from an emergency or lighting circuit breaker panel and shall have a locked circuit breaker. Earth grounds shall also terminate to the same circuit breaker panel from each respective control panel.

2.3 FIRE ALARM SYSTEM SEQUENCE OF OPERATION

A. The system shall identify any off normal condition and log each condition into the system database as an event.

1. The system shall automatically display on the control panel Liquid Crystal Display the first event of the highest priority by type. The priorities and types shall be alarm, supervisory, trouble, and monitor.

2. The system shall have a Queue operation and shall not require event acknowledgment by the system operator. The system shall have a labeled color coded indicator for each type of event; alarm - red, supervisory - yellow, trouble - yellow, monitor - yellow. When an unseen event exists for a given type, the indicator shall be lit.

3. For each event, the display shall include the current time, the total number of events, the type of event, the time the event occurred and up to a 42 character custom user description.

4. The user shall be able to review each event by simply selecting scrolling keys (up-down) for each event type.

5. New alarm, supervisory, or trouble events shall sound a silencing audible signal at the control panel.

B. Operation of any alarm initiating device shall automatically:

1. Update the control/display as described above (A.1.)

2. Sound all audible speaker appliances with a prerecorded message. Audible devices shall have the ability to be silenced.

3. Activate all strobe appliances throughout the facility. ALL STROBE APPLIANCES SHALL BE SYNCHRONIZED WITH EACH OTHER IN ANY LOCATION WITH TWO OR MORE DEVICES IN A COMMON FIELD OF VIEW. Visual devices shall be non-silenced unless the system is successfully reset.

4. Operate control relay contacts to shutdown all HVAC units serving the floor of alarm initiation.

5. Operate control relay contacts to return all elevators that serve the floor of alarm initiation to the ground floor. If the alarm originates from the ground floor, operate control circuits contacts to return all elevators to the floor above or to a level as directed by the local fire department.

6. Operate control relay contacts to release all magnetically held smoke doors throughout the building.

7. Visually annunciate the individual point of alarm on all remote annunciator panels. The visual indication shall remain on until the alarm condition is reset to normal.

8. Transmit an alarm condition, via the integral central station communicator, to central station/Local Fire Department (as required by the AHJ).

C. Elevator smoke and heat detector sequences shall comply with the ANSI A17.1 requirements for main/alternate floor recalls.

D. Activation of a sprinkler supervisory initiating device shall:

1. Update the control/display as described above (A.1.)
2. Transmit a supervisory condition, via the integral central station communicator, to central station/Local Fire Department (as required by the AHJ).
3. Visually annunciate the individual point of alarm on all remote annunciator panels. The visual indication shall remain on until the alarm condition is reset to normal.

E. The entire fire alarm system wiring shall be electrically supervised to automatically detect and report trouble conditions to the fire alarm control panel. Any opens, grounds or disarrangement of system wiring and shorts across alarm signaling wiring shall automatically:

1. Update the control/display as described above (A.1.)
2. Transmit a trouble condition, via the integral central station communicator, to central station/Local Fire Department (as required by the AHJ).
3. Visually and audibly annunciate a general trouble condition, on the remote annunciator panels. The visual indication shall remain on until the trouble condition is repaired.

2.4 SUPPORT FOR INSTALLER AND OWNER MAINTENANCE

A. Provide a coded one-man walk test feature. Allow audible or silent testing. Signal alarms and troubles during test. Allow receipt of alarms and programmed operations for alarms from areas not under test.

B. Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.

C. Provide loop controller diagnostics to identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the circuit wiring of remote module shall be identified by device address.

D. Allow the user to display/report the condition of addressable analog detectors. Include device address, device type, percent obscuration, and maintenance indicator. The maintenance indicator shall provide the user with a measure of contamination of a device upon which cleaning decisions can confidently be made.

E. Allow the user to report history for alarm, supervisory, monitor, trouble, smoke verification, watchdog, and restore activity. Include Facility Name, Licensee, Project Program Compilation date, Compiler Version, Project Revision Number, and the time and date of the History Report.

F. Allow the user to disable/enable devices, zones, actions, timers and sequences. Protect the disable function with a password.

G. Allow the user to activate/restore outputs, actions, sequences, and simulate detector smoke levels.

H. Allow the service user to enter time and date, reconfigure an external port for download programming, initiate auto programming and change passwords. Protect these functions with a password.

I. THE END-USER SHALL RETAIN COMPLETE RIGHTS AND OWNERSHIP TO ALL SOFTWARE RUNNING IN THE SYSTEM. The fire alarm equipment vendor shall provide useable hard and soft copies of the software database to the End-User at the end of the warranty period. The database provided shall be useable by any authorized and certified distributor of the product line and shall include all applicable passwords necessary for total and unrestricted use and modification of the database. The Consulting Engineer shall define the extent of hardcopy database documentation to be provided.

2.5 UL LISTED AND APPROVED EQUIPMENT

A. Fire Alarm Control Panel Requirements: The fire alarm control panel or panels and all system devices (Speaker-strobes, strobes, pull stations, smoke and heat detectors, etc. shall be Edwards Systems Technology (EST) by UTC Fire and Security (formerly GE Security) type EST3 series (or equal). All under one label "UL listed and approved" for the use of fire alarm systems in this area of the United States of America. The operating controls shall be located behind locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified.

B. System Controllers: The main controller 3-CPU shall be supervised, site programmable, and of modular design supporting up to 125 detectors and 125 remote modules per addressable Signaling line Circuit (SLC). The CPU shall support up to 10 SLC's per panel for a total system capacity of 2500 Intelligent Addressable points. The system shall be designed with peer-to-peer networking capability for enhanced survivability, with support for up to 64 modes, each with up to 2500 points and an overall capacity of 160,000 points. The cabinets shall be steel.

C. The system shall store all basic system functionality and job specific data in non-volatile memory. All site specific and operating data shall survive a complete power failure intact. Passwords shall protect any changes to system operations.

D. The Main Controller Module shall control and monitor all local or remote peripherals. It shall support a large 960 character LCD, power supply, remote LCD and zone display annunciators, printers, and support communication interface standard protocol (CSI) devices such as color computer annunciators and color graphic displays. If configured as a network, each system shall display each and every point in the system and shall also support up to 64 remote LCD display annunciators. Remote LCD annunciators shall also display each and every point in the system and be sized with the same number of characters as in the main FACP display.

E. The panel shall have an interface module for remote site monitoring. The module shall have a dialer (alarm communicator transmitter (DACT)) module to transmit alarm, supervisory and trouble signals to a Central Monitoring Station (CMS). The DACT shall support dual telephones lines, Contact I.D. communications, and configured for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, auto test call, and be site programmable. The dialer shall be capable of transmitting every individual alarm condition to the central station.

F. The system shall have built-in automatic system programming to automatically address and map all system devices attached to the main controller. A minimum default single stage alarm system operation shall be supported with alarm silence, event silence, drill, lamp test, and reset common controls.

G. Advanced Windows-based System Definition Utility with Program Version Reporting to document any and all changes made during system start-up or system commissioning shall be used to maintain site specific programming. Time and Date Stamps of all modifications made to the program must be included to allow full retention of all previous program version data. It shall support programming of any input point to any output point. The system shall support the use of Bar Code readers to assist custom programming functions. It shall allow authorized customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms. The system program shall meet the requirements of this project, current codes and standards, and satisfy the local Authority Having Jurisdiction.

H. The system shall support distributed processor intelligent detectors with the following operational attributes; integral multiple differential sensors, automatic device mapping, electronic addressing, environmental compensation, pre-alarm, dirty detector identification, automatic day/night sensitivity adjustment, normal/alarm LEDs, relay bases, sounder bases and isolator bases.

I. The system shall use full digital communications to supervise all addressable loop devices for placement, correct location, and operation. It shall allow swapping of "same type" devices without the need of addressing and impose the "location" parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is mapped and defined into the system.

J. Each controller shall contain a RS232 printer/programming port for programming locally via an IBM PC. When operational, each controller shall support a printer through the RS232 port and be capable of message routing.

K. System circuits shall be configured as follows: Addressable analog SLC loops Class B (Style 4); Initiating Device Circuits Class B; Notification Appliance Circuits Class B; Network Communications Class B; Annunciator Communications Class B.

L. Single stage operation shall be provided.

M. The system shall have a UL Listed Detector Sensitivity test feature, which will be a function of the smoke detectors and performed automatically every 4 hours.

N. The system shall support 100% of all remote devices in alarm and provide support for a 100% compliment of detector isolator bases.

O. All panel modules shall be supervised for placement and return trouble if damaged or removed.

P. The system shall have a CPU watchdog circuit to initiate trouble should the CPU fail.

Q. The Fire Alarm / Life Safety System shall incorporate a true digital integrated audio system into the network, multiplexing 8 independent audio channels over a single pair of wires. The system shall include distributed audio amplifiers, one for each speaker circuit, for the ultimate in system survivability. The system shall provide a local temporal back up tone at each amplifier to allow evacuation signals to be broadcast in the protected premises in the event of a loss of data communication from the multiplexed audio riser. A digital message unit shall be provided which provides up to 32 minutes of pre-recorded emergency messaging. The message contained in the fully digital message unit shall be recordable in the field on a computer. Audio Source Unit (3-ASU): The Fire Alarm / Life safety System shall be provided with a fully integrated Emergency Communications System. The Emergency Communications System shall include a paging microphone, digital message playback unit, and 8 fully digitized and multiplexed Audio Channels. Four dedicated page mode control switches shall provide the emergency operator with instantaneous one touch paging to safely control the staged evacuation of building occupants. Automatic programming shall dynamically group the most frequently targeted paging zones. The "All Call" switch will direct the manual page to the entire facility. The " Page to Evac" switch will direct the manual page to those building areas automatically receiving the Evacuation Signal. The "Page to Alert" switch will direct the manual page to those building areas automatically receiving the Alert Signal. The "All Call Minus" switch will direct the manual page to those building areas which are programmed to receive the auxiliary and general channel connections such as stairwells. The system shall have paging control switches and LEDs to support specific zone selection as shown on the plans. The zone control / displays shall confirm amplifier selection and annunciate amplifier and amplifier circuit trouble. The system shall automatically deliver a preannounce tone of 1000 Hz for three seconds when the emergency operator presses the microphone talk key. A 'ready to page' LED shall flash during the preannounce and turn steady when the system is ready for the user's page delivery. The system shall include a page deactivation timer which activates for 3 seconds when the emergency user releases the microphone talk key. Should the user subsequently press the microphone key during the deactivation period a page can be delivered immediately. Should the timer complete its cycle the system shall automatically restore emergency signaling and any subsequent paging will be preceded by the pre-announce tone. A VU display shall display voice level to the emergency operator.

R. Audio Amplifiers: Each audio power amplifier shall have integral audio signal de-multiplexers, allowing the amplifier to select any one of eight digitized audio channels. The channel selection shall be directed by the system software. Up to 8 multiple and different audio signals must be able to be broadcast simultaneously from the same system network node. Each amplifier output shall include a dedicated, supervised 25/70 Vrms speaker circuit which is suitable for connection of emergency speaker appliances. Each amplifier shall also include a notification appliance circuit rated at 24Vdc @ 3.5A for connection of visible (strobe) appliances. This circuit shall be fully programmable and it shall be possible to define the circuit for the support of audible, visible, or ancillary devices. Standby Audio amplifiers shall be provided that automatically sense the failure of a primary amplifier, and automatically program themselves to select and de-multiplex the same audio information channel of the failed primary amplifier, and fully replace the function of the failed amplifier. In the event of a total loss of audio data communications, all amplifiers will default to the local "EVAC" tone generator channel. If the local panel has an alarm condition, then all amplifiers will sound the EVAC signal on their connected speaker circuits. In the event of a loss of the fully digitized, multiplexed audio riser, the audio amplifiers shall automatically default to an internally generated alarm tone which shall be operated at a 3-3-3 temporal pattern. Audio amplifiers shall automatically detect a short circuit condition on the connected speaker circuit wiring and shall inhibit itself from driving into that short circuit condition.

S. User Interface: The 3-LCDXL Display Module shall be of membrane style construction with a 24 line by 40-character (960 total characters) Liquid Crystal Display (LCD). The LCD shall use super-twist technology and backlighting for high contrast visual clarity and a colored gray/black and white display. In the normal mode the LCD shall display the time, a customer facility name, and the number of history events. In the alarm mode the LCD display the total number of events and the type of event on display. The LCD shall reserve 42 characters of display space for each user custom message by addressable device. The module shall have visual indicators for the following common control functions; Power, Alarm, Supervisory, Monitor, Trouble, Disable, Ground Fault, CPU fail, and Test. There shall be common control keys and visual indicators for reset, alarm silence, panel silence, and drill. Provide four pairs of display control keys for selection of event display by type (alarm, supervisory, monitor and trouble) and forward / backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicators to flash the indicators when undisplayed events are available for display and turn on steady when all events have been displayed. The LCD shall display the first event of the highest priority as well as the previous seven (7) alarm events "hands free" in chronological order so that the arriving firefighter may track the fires progression. Provide system function keys; status, reports, enable, disable, activate, restore, program, and test. The module shall have a numeric keypad, zero through nine with delete and enter keys.

T. Power Supplies: The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 Vdc at 7.0A continuous for notification appliance circuits. The power supply shall be capable of providing 7A to output circuits for a maximum period of 100 ms. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes.

U. Auxiliary power supplies shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 Vdc at 7.0A continuous for notification appliance circuits. The power supply shall be capable of providing 7A to output circuits for a maximum period of 100 ms. All outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 15 minutes.

V. Network alpha-numeric annunciators shall be located throughout the facility as indicated on the plans. The system shall have the capacity to support 64 network annunciators or EST3 network panel nodes. Each annunciator shall contain a supervised, back lit, liquid crystal with a minimum of 8 line with 21 characters per line. Where required, the annunciator shall include additional zonal annunciation and manual control without additional enclosures. The annunciator shall support full ability to serve as the operating interface to the system and shall include the following features; Matched appearance with other system displays. Each LCD Display on each node (cabinet) in the system shall be configurable to show the status of any or all of the following functions anywhere in the system: Alarm, Supervisory, Trouble, Monitor. It must be possible to have up to 64 network annunciators or EST3 panels on the network.

W. Each annunciator must be capable of supporting custom messages as well as system event annunciation. It must be possible to filter unwanted annunciation of trouble, alarm or supervisory functions on a by point or by geographic area.

X. The annunciators shall be mounted in stand-alone enclosures or integrated into the network panels as indicated on the plans.

2.6 COMPONENTS

A. Intelligent Devices — General: Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.

B. Intelligent Detectors — General: The System Intelligent Detectors shall be capable of full digital communications using both broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms. Signal patterns that are not typical of fires shall be eliminated by digital filters. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable. Each detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and analog loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total analog loop response time for detectors changing state shall be 0.5 seconds. Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the analog loop controller. A red LED shall flash to display alarm status. The detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient "Environmental Thresholds" approximately six times an hour. The microprocessor shall continually monitor the environmental impact of temperature, humidity, other contaminates as well as detector aging. The process shall employ digital compensation to adapt the detector to both 24-hour long term and 4-hour short-term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the "learned" base line sensitivity. The base line sensitivity information shall be updated and permanently stored at the detector approximately once every hour. The intelligent analog detectors shall be suitable for mounting on any Signature Series detector mounting base.

C. Fixed Temperature/Rate of Rise Heat Detector/Combination Heat and CO Detector, SIGA-HRD, SIGA-HCD: Provide intelligent combination fixed temperature/rate-of-rise heat detectors SIGA-HRS. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135oF (57oC) and a rate-of-rise alarm point of 15oF (9oC) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications. Where shown on the project plans, include SIGA2-HCOS combination Heat and Carbon Monoxide (CO) detector. The combination Heat and CO device shall report separately to the control panel where a heat condition is considered a fire alarm and a CO condition is a supervisory alarm with separate and unique evacuation sequence.

D. Photoelectric Smoke Detector, SIGA-PD: Provide intelligent photoelectric smoke detectors SIGA-PD. The analog photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC or the SIGA-PRO Signature Program/Service Tool. The photo detector shall be rated for ceiling installation at a minimum of 30 ft (9.1m) centers and be suitable for wall mount applications. The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 5,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment: Temperature: 32oF to 120oF (0oC to 49oC), Humidity: 0-93% RH, non-condensing, Elevation: no limit.

E. Addressable Carbon Monoxide (CO) Detector, EST model SIGA-COD with audible sounder base. Provide intelligent addressable Carbon Monoxide Detector with Temporal 4 Audible Base. The CO detection element shall indicate a trouble condition at the FACP signaling end of life and the CO element of the detector shall be field replaceable. It shall be programmed at the main control panel as a supervisory indication and transmit a separate supervisory signal to the central station. The CO detector shall be UL 2075 listed.

F. Standard Detector Mounting Bases, SIGA-SB / SIGA-SB4: Provide standard detector mounting bases SIGA-SB suitable for mounting on North American 1-gang, 3½" or 4" octagon box and 4" square box. The base shall, contain no electronics, support all Signature Series detector types and have the following minimum requirements: Removal of the respective detector shall not affect communications with other detectors, Terminal connections shall be made on the room side of the base, bases that must be removed to gain access to the terminals shall not be acceptable. The base shall be capable of supporting one (1) Signature Series SIGA-LED Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.

G. Audible Detector Mounting Base, SIGA-AB4GT. Where shown on the project plans include detector audible/sounder base model SIGA-AB4GT. The sounder base shall be capable of two tones, Temporal 3 for a fire condition and Temporal 4 for a Carbon monoxide condition. The tones shall be fully programmable and also synchronize the sound with other sounder bases. The system shall be UL2017 listed for dual signaling for this purpose.

H. Duct Detector Housing, SIGA-SD: Provide model SIGA-SD Low profile intelligent addressable DUCT smoke detector as indicated on the project plans. Provide for variations in duct air velocity between 100 and 4,000 feet per minute and include a wide sensitivity range of .79 to 2.46%/ft. Obscuration. Include one Form-C shut down relay rated 2.0 amps @ 30 Vdc and also include slave high contact relays if required. Provide an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. The addressable DUCT housing shall be suitable for extreme environments, including a temperature range of –20 to 158 degrees F (-29 to 70 degrees Celsius) and offer a harsh environment gasket option. Provide Remote Alarm LED Indicators SIGA-LED and/or remote test station model SD-TRK as indicated on the project plans.

I. Intelligent Modules — General: It shall be possible to address each Intelligent Signature Series module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment: Temperature: 32oF to 120oF (0oC to 49oC), Humidity: 0-93% RH, non-condensing.

J. Single Input Module, SIGA-CT1 (Waterflow Detectors, Tamper Switches etc.): Provide intelligent single input modules SIGA-CT1. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The single input module shall support the following circuit types: Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.), Normally-Open Alarm Delayed Latching (Waterflow Switches), Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.), Normally-Open Active Latching (Supervisory, Tamper Switches).

K. Dual Input Module, SIGA-CT2: Provide intelligent dual input modules SIGA-CT2. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The dual input module shall support the following circuit types: Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.), Normally-Open Alarm Delayed Latching (Waterflow Switches), Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.), Normally-Open Active Latching (Supervisory, Tamper Switches).

L. Single Input Signal Module, SIGA-CC1: Provide intelligent single input signal modules SIGA-CC1. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone". The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes. The single input signal module shall support the following operations: Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A).

M. Control Relay Module, SIGA-CR and SIGA-CRH: Provide intelligent control relay modules SIGA-CR for low current/voltage applications and SIGA-CRH "H" for High current/voltage applications. The Control Relay Module shall be used for control of external appliances (door locking and holding, Damper control etc.) or equipment shutdown. The SIGA-CR Control Relay Module shall provide one form "C" dry relay contact rated at 2 amps @ 24 Vdc. The control relay shall be rated for pilot duty and releasing systems. The SIGA-CRH shall provide dual Form-C relay contacts rated for 7 amps 120 VAC\240VAC and 6 Amps @ 24 Vdc. The position of the relay contact shall be confirmed by the system firmware. The Low Contact

Relay Control Module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" deep 4" square box with a 1-gang cover. The High Contact Control Relay shall be suitable for mounting in North American double-gang box or 4 inch square box that is a minimum of 2 1/8 (54mm) inches deep.

N. Intelligent Manual Pull Stations — General: It shall be possible to address each Signature Series fire alarm pull station without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The manual stations shall have a minimum of 2 diagnostic LEDs mounted on their integral, factory assembled single or two stage input module. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The station shall be capable of storing up to 24 diagnostic codes that can be retrieved for troubleshooting assistance. Input circuit wiring shall be supervised for open and ground faults. The fire alarm pull station shall be suitable for operation in the following environment: Temperature: 32^{O}F to 120^{O}F (0^{O}C to 49^{O}C), Humidity: 0-93% RH, non-condensing.

O. Manual Pull Station, SIGA-270: Provide intelligent single action, single stage fire alarm stations SIGA-270. The fire alarm station shall be of metal construction with an internal toggle switch. Provide a locked test feature. Finish the station in red with silver "PULL IN CASE OF FIRE" English lettering. The manual station shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

P. Notification Appliances – General: All appliances shall be UL Listed for Fire Protective Service. All strobe appliances or combination appliances with strobes shall be capable of providing the "Equivalent Facilitation" which is allowed under the Americans with Disabilities Act accessibility guidelines (ADA(AG)), and shall be UL 1971, and ULC S526 Listed. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel **(NO EXCEPTIONS)** specified to insure absolute compatibility between the appliances and the control panels, and to ensure that the application of the appliances are done in accordance with the single manufacturers' instructions. Any appliances that do not meet the above requirements and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from **THE CONTROL PANEL MANUFACTURER** clearly stating that the control equipment (as submitted) is 100% compatible with the submitted Notification Appliances.

Q. Strobes, G1RF-VM Series: Provide EST Series G1RF-VM series low profile wall mounted strobes at the locations shown on the drawings. Strobes shall provide synchronized flash outputs. Strobe output shall be field selectable as indicated on the drawings in one of the following intensity levels; 15/75, 15cd, 30cd, 75cd or 110cd. Low profile strobes shall mount in a North American 1-gang box or surface mounted on a matching back box provided by the manufacturer, as directed in the field.

R. Provide high fidelity (520 Hz compatible)speaker/strobes with a 4" cone as manufactured by EST, model G4HF-S7 Series. The rear of the speaker shall be completely sealed protecting the cone during and after installation and screw terminals shall be provided for wiring. Speaker/strobe housings shall be red and include "FIRE" labeling. Speakers shall be provided for use with 70V systems and shall provide power taps at 1/4w, 1/2w, 1w, and 2w. High Fidelity Speaker listed frequency response of 400 to 4,000 Hz and listed sound output of 90.5 dBA at 10 feet, as measured in reverberation room per UL-1480. Speaker shall be listed in compliance to produce 520Hz low frequency tone signal. Strobes shall provide 15, 30, 75 cd 110 candela synchronized flash outputs. The strobe shall have lens markings oriented for wall mounting. Ceiling mounted Speaker/Strobes shall have lens markings with correctly oriented lettering. Speaker/strobes shall mount in a North American 4" electrical box with extension ring using the 2 screws provided with ring.

S. Multi-Voltage Control Relays, MR-200 Series: Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be DPDT and rated for 10 amperes at 115 Vac. A single relay may be energized from a voltage source of 24 Vdc, 24 Vac, 115 Vac, or 230 Vac. A red LED shall indicate the relay is energized. A metal enclosure shall be provided.

T. Electromagnetic Doorholders – General: Electromagnetic doorholders submitted for use must have written proof of their compatibility for the purposes intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purposes intended.

U. Wall Mounted, 1504/1505/1508/1509 Series: Provide flush, semi-flush or surface wall mounted electromagnetic doorholder/releases rated at 24 Vac/dc as directed by the Consulting Engineer. Finish shall be brushed zinc.

V. STI Stopper II Lexan Guards: Manual pull stations that are provided with STI Stopper II Lexan guards shall include non-audible alarms as required on the plans. They shall be surface or flush mounting, as required for each individual device. Stopper Covers shall only be included on devices shown on the plans to include them.

PART 3 – EXECUTION

3.1 INSTALLATION

A. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagram. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the manufacturer, approved by the local Fire Department and specified within.

B. All penetration of floor slabs and firewalls shall be sleeved (1" conduit minimum) fire stopped in accordance with all local fire codes.

C. End of Line Resistors shall be furnished as required for mounting as directed by the manufacturer. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled so removal of the device is not required to identify the EOL device.

D. All manual pull stations shall be mounted 48 inches above the finished floor, as measured to the handle.

E. All audio/visual devices shall be mounted 80 inches above the finished floor, as measured to the lens. Devices shall be mounted no less than 6 inches from the ceiling. All audiovisual devices shall have Lexan covers in all areas subject to mechanical damage.

F. No area smoke detectors shall be mounted within 36 inches of any HVAC supply, return air register or lighting fixture.

G. No area smoke or heat detector shall be mounted within 12 inches of any wall. All detectors shall be installed in strict accordance with NFPA 72 (1999) guidelines for such devices.

H. All mechanical rooms, boiler rooms, gymnasiums, wiring closets, custodian rooms, attic spaces, etc. or areas with no hung ceilings shall be piped with 3\4" conduit. All device plenum rated wiring shall be mechanically protected with conduit. All areas in public view shall be in metal V-700 wiremold (or equal). All boxes must be painted red and labeled "FIRE ALARM".

I. All addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, Ansul/Hood subsystems, or door release. Label all addressable modules as to their function.

J. New door holders shall derive their 24VAC/VDC power from a separate power supply housed in a dedicated, metal enclosure. The power supply shall have a 120VAC feed and is to be centrally located to serve door holders on a per floor or area basis. All existing door holders shall be connected to new FACP. E.C. shall extend all existing wiring in order to make this work. Locations and quantities of door holder power supplies shall be referenced and submitted in the submission package for approval by the Consulting Engineer.

K. All low voltage wiring terminated to the fire alarm system shall be PLENUM RATED with no exceptions and no less than No. 18 AWG in size, and solid copper.

L. All line voltage (120VAC) wiring shall be no less than No. 12 AWG in size, and solid copper. This shall include all system grounding. FACP must have a DEDICATED 20 Amp circuit marked back at the power panel NO EXCEPTIONS.

M. All wiring shall be color-coded throughout, to National Electrical Code standards.

N. Power-limited/Non-power-limited NEC wiring standards SHALL BE OBSERVED.

O. All junction box covers shall be painted federal safety red and labeled FIRE ALARM SYSTEM ONLY in black letters.

P. Fire alarm system wiring shall not co-mingle with any other system wiring in the facility. Conduits shall not be shared under any circumstance. Only when fire alarm wiring enters the enclosure of a monitored or controlled system will co-habitation be permitted (i.e. at fan starters or elevator controllers). THIS WILL BE FIELD INSPECTED BY THE PROJECT ENGINEER.

Q. Fire alarm control panel enclosures shall have engraved labels indicating, “FIRE ALARM SYSTEM”, and the areas of the building served by that panel.

R. Auxiliary relays shall be appropriately labeled to indicate “FIRE ALARM SYSTEM” and their specific function (i.e. FAN S-1 SHUTDOWN).

S. All fire alarm wiring shall be continuous and unspliced. Terminations shall only occur at fire alarm devices or control panel enclosures under terminal screws. All other splicing methods are specifically disallowed (i.e. plastic wirenuts).

T. All fire alarm wiring shall be installed using a dedicated system of supports (i.e. bridle rings). Fire alarm wiring shall not be bundled or strapped to existing conduit, pipe or wire in the facility. THIS WILL BE FIELD INSPECTED BY THE PROJECT ENGINEER.

U. All fire alarm wiring shall be sleeved when passing through any wall, using conduit sleeves (1” min.) with bushings, and fire stopped in accordance with Code.

V. The system shall be arranged to receive power from one three wire 120 Vac, 20 A supply. All low voltage operation shall be provided from the fire alarm control panel.

W. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the Contract Drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Project Engineer. Failure to bring such issues to the attention of the Project Engineer shall be the exclusive liability of the installing Electrical Contractor.

X. The existing fire alarm system shall remain in operation until such time that approval has been granted for its removal. The installing Electrical Contractor shall be responsible for the upkeep of the existing system until such time that it can be removed.

Y. The installing Electrical Contractor shall be responsible for the removal of ENTIRE existing fire alarm system components and controls on the demolition drawing shown or not, upon approval of the AHJ and the Consulting Engineer. The End-User reserves the right to retain any existing fire alarm system components, upon their request. All existing fire alarm system components requiring special handling for disposal (due to radioactivity) shall be the responsibility of the installing contractor. Written proof of proper disposal by the installing contractor shall be required prior to release of outstanding retainage.

3.2 FIELD QUALITY CONTROL

A. The system shall be installed and fully tested under the supervision of a trained manufacturer's representative. The system shall be demonstrated to perform all of the function as specified.

B. The installing contractor or fire alarm equipment vendor shall have no less than two (2) NICET Level II fire alarm technicians dedicated to this project.

C. The Installing Contract and the Fire Alarm System Vendor shall, upon the request of the Consulting Engineer or End-User, attend any and all project meetings for the purpose of accurately determining progress.

D. It shall be the responsibility of the installing contractor to assure that construction debris does not adversely affect any sensing devices installed as part of this project. Should it be deemed necessary by the Consulting Engineer, End-User or AHJ, the installing contractor shall be responsible for the cleaning of all smoke detectors prior to final acceptance.

3.3 TESTS

A. The fire alarm system vendor shall test the system in accordance with the manufacturer's requirements and NFPA 72 7-3 (1999). The vendor shall provide completed NFPA 72 7-3 (1999) reports to the Consulting Engineer for review and approval prior to final acceptance.

B. Each individual system operation on a circuit by circuit basis shall be tested for its complete operation. The procedure for testing the entire fire alarm system shall be set forth with the consent of the code enforcement official, the Engineer and the manufacturer.

3.4 DOCUMENTATION AND TRAINING

A. The contractor shall compile and provide to the owners three (3) complete manual on the completed system to include SITE SPECIFIC operating and maintenance instruction, catalog cuts of all equipment and components, as-built wiring diagrams and a manufacturer's suggested spare parts list. An operational Video, on DVD media, shall also be included.

B. In addition to the above manuals, the Electrical Contractor shall provide the services of the manufacturer's trained representative for **two (2)** separate calendar days for a period of four **(4) hours** per day to instruct the owners' designated personnel on the operation and maintenance of the entire system.

C. As-built drawings shall consist of the following:

1. Complete revision of all previously submitted drawings
2. Point-to-point depiction of all device wiring on the device layout floor plans.
3. One (1) set of B-size, laminated as-built drawings.
4. Two (2) sets of 30"x42"inch 1\16"=1' scale drawings showing all points of fire alarm. One set shall be submitted with the close-out documents. Second set shall be mounted in frame with a Lexan cover. These drawing must be submitted to project Engineer or approval.

D. Turnover of all software database hard/soft copies shall be required. This shall include all possible programming software logs, diskettes or CDs containing exported project files, hard copies of all device maps, the revision number of the version of programming utility used, and all required passwords. The turnover of all database information shall occur prior to the end of the One (1) warranty period (or period as amended earlier in this specification).

END OF SECTION

SECTION 26 0810

TELECOMMUNICATIONS AND AUDIO/VISUAL CABLING SYSTEM

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work covered by this specification includes the system integration and construction described, including all labor necessary to perform and complete such work; all materials and equipment incorporated or to be incorporated in such work; and all services, facilities, tools and equipment necessary or used to perform and complete such work and all systems configuration, testing and turnover for a fully operational and functioning backbone system.

B. Before the start of any work coordinate all equipment, devices, cable, racks, supports etc. with Owner.

1.2 IT INFRASTRUCTURE SYSTEM

A. Lateral Cabling

1. Provide, test and document Category 6 UTP copper horizontal communications cabling as shown in construction documents. Horizontal cabling in Basement shall derive from new data racks in IDF Closet B140a located in Basement. On 2nd and 3rd Floors in Academic New Addition, horizontal cable shall derive from new data rack mounted patch panel located on 2nd Floor in Data Closet 276 to serve south side 3 floors and 3rd Floor Data Closet 301 to serve north side 3 floors. Cable shall terminate at each Wireless Access Point (WAP) and each data outlet location as per construction documents. Cabling shall be run above the ceiling supported by J-hooks, inside surface mounted raceway or within conduit. Leave 10' slack neatly coiled and tie wrapped in closet for flexibility.

2. Core drill and provide conduit sleeve as required to provide access through cinderblock walls into classrooms for lateral cabling above ceilings.

3. All lateral cabling installation shall be concealed above ceiling. In areas that require being exposed cable shall be run in the following manner: In unfinished area install cable in EMT conduit and in finished area (classrooms, offices, corridors, etc) provide steel surface mounted raceway to hide and protect lateral cable. No cabling shall be run exposed except in data rack closet on cable management.

B. Provide all cable termination patch panels, blocks, equipment racks and cable management organizers, rear support wire management, ladder rack, cross connect supports and guide rings as required for a full and complete installation

C. Provide all outlet jacks, connectors, terminating devices, faceplates, and similar components required for a complete installation as indicated in details in construction documents.

D. Provide all labeling and documentation of all cables, racks, outlets and hardware installed under this contract.

E. Provide all testing and test documentation as described below.

F. Provide J-STD-607-A standard-compliant telecommunications ground backbone cables, bus bars, connectors and components required for a complete telecommunications grounding system installation.

G. Provide all connections to the telecommunications grounding system.

H. Provide fire-stopping of all rated wall penetrations and openings through rated walls after installation of telecommunications cabling.

I. Provide all non-specified miscellaneous hardware, including, but not limited to nuts, bolts, re-enterable cable ties, spiral wrap, wire rings, supporting hardware and similar components required for a complete cabling system installation.

J. Remove all abandoned cabling.

1.3 AUDIO/VISUAL

A. Lateral Cabling

1. Provide, test and document HDMI cable and Category 6 cable as shown in construction documents. Horizontal cabling shall derive from Teachers outlet to Interactive Monitor as indicated in construction documents. Category 6 cabling shall be run above the ceiling supported by J-hooks, inside surface mounted raceway or within conduit. Leave 5' slack neatly coiled and tie wrapped above ceiling to data closet.

2. All lateral cabling installation shall be concealed above ceiling and vertical cabling in wall in conduit stub-ups. In areas that require being exposed cable shall be run in steel surface mounted raceway to hide and protect cable. No cabling shall be run exposed.

B. Provide all cable and wire termination at outlets and guide rings as required for a full and complete installation.

C. Provide all outlet jacks, connectors, terminating devices, faceplates, and similar components required for a complete installation as indicated in details in construction documents.

D. Provide all labeling and documentation of all cables, outlets and hardware installed under this contract.

E. Provide all testing and test documentation of cables.

F. Provide all non-specified miscellaneous hardware, including, but not limited to nuts, bolts, re-enterable cable ties, spiral wrap, wire rings, supporting hardware and similar components required for a complete cabling system installation.

G. Remove all abandoned cabling.

1.4 TELEPHONE

A. Provide a mini PBX cabinet for 25 phone line connection in Data Closet 301 located in 3rd Floor New Academic Addition.

B. Provide 25 pair telephone cable from new IDF in Data Closet 301 in New Academic Addition to Main PBX located in Closet within Nurses Office on the 1st Floor of the existing building.

C. Provide termination on both ends, label and test for continuity and sound.

1.5 SUBMITTALS

A. General: The contractor shall submit product documentation for all components that will be used for this project. The documentation must be approved before order and installation. The contractor shall furnish the product documentation on any substituted product with the bid response. The remaining submittals shall be furnished for approval one (1) week after award of contract.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations to be consistent with existing building arrangement. Coordinate with Owner before the start of any work.

C. At completion of installation, furnish a complete set of As-Built documents, including plan view and elevation drawings, cable test results and cable termination and cross connection schedules.

D. As-Built drawings shall be submitted in format as indicated in division 1. As-built cable schedules shall be provided in (1) hard copy and (1) computer CD format.

1.6 QUALITY ASSURANCE

A. All products and materials shall be new, clean, and free of defects or damage and of first quality.

B. The Contractor shall be responsible for the receipt, delivery and safe storage of materials and equipment to the job site. Deliver materials (except bulk materials) in manufacturers' unopened containers.

C. The Contractor shall comply with all applicable governmental regulations and with all Federal, State, County, City, and other applicable codes, ordinances, regulations and BICSI installation practices.

D. Local electrical and building codes may differ from national codes. Follow the most stringent code or recommendations.

E. It is the intent of these Specifications to provide a complete workable telecommunications cabling system ready for the Owner's use. Any item not specifically shown on the Drawings or called for in the Specifications, but normally required to conform to the intent, is to be considered as part of the Contract.

F. Any given item of equipment or material shall be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item shall not be permitted, unless specifically noted otherwise or approved by the Owner.

G. These Specifications are equipment and performance Specifications. Actual installation shall be as indicated on the Drawings. Any discrepancies found between the Specifications and Drawings shall be brought to the attention of the Construction Manager. Installation and details indicated on the Drawings shall govern if they differ from the Specifications.

H. Certain terms such as "shall, provide, install, complete, etc." are not used in some parts of these Specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.

1.7 COORDINATION OF THE WORK

A. Coordinate project and schedule work with the general contractor in accordance with the schedule and construction sequence.

B. Wherever work interconnects with work of other trades, provide the information necessary to properly install all the connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels, and where to leave ceiling spaces accessible for wiring installation.

C. Attend all construction meetings as requested by the Owner or Construction Manager.

D. Maintain a complete file of shop drawings available at all times to the Construction Manager.

E. Prior to actual installation, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper compliance with the design intent.

PART 2 - PRODUCTS

Substitutions or alternates for the manufacturers listed will not be permitted without the written consent of the Owner. Refer to Section 1.4, Submittals, for further information.

2.1 UTP COPPER CABLE

A. For Horizontal Cable, Plenum rated, (4) 23 AWG twisted unshielded pairs, to meet or exceed Category 6 code performance standards, solid copper, insulated conductors, UL Listed CMP
Manufacturer: Commscope, Hitachi or AMP Netconnect - Color – Data: Blue and VOIP Telephone: White.

B. For Horizontal Cable, Plenum rated (2) 22 AWG twisted unshielded pairs, to meet or exceed Category 3 code performance standards, solid copper insulated conductors, UL Listed CMP
Manufacturer: Commscope, Hitachi or AMP Netconnect - Color – Telephone: White.

2.2 FIBER OPTIC CABLE

A. Orange aluminum interlocking armored jacket, multimode OM3 fiber optic cable, 10 gig capable, 50 micron, 12-strand, plenum rated. UL Listed OFCP. Contractor shall properly bond cable armor. Manufacturer: Corning.

B. Provide in IDF Closet B140a, 2nd Floor Data Closet 276 A, 3rd Floor Data Closet 301 and in Library MDF room in rack, the Corning Closet Connector Housing CCH-01U; for fiber connection also provide assembly connector Corning model no. CCH-CP06-91. Utilize Coring Unicam connector, no epoxy, no polish.

2.3 AUDIO/VISUAL CABLE

A. Category 6 cable shall be utilized for HDMI and data runs.

2.4 TERMINATION HARDWARE

A. Patch Panel for UTP terminations. Meet or exceed TIA and ISO Category 6 component performance requirements. Universal wiring T568A or T568B. All terminations shall be T568B. Manufacturer: AMP Netconnect.

B. Category 6 Modular Jack for UTP terminations. Meet or exceed TIA and ISO Category 6 component performance requirements. Universal wiring T568A or T568B. All terminations shall be T568B. Color – Blue for Data and White for Voice. Manufacturer: AMP Netconnect.

2.5 OUTLET COMPONENTS

A. Refer to construction documents, provide Legrand for outlet component type for data/telephone and audio/visual

B. For Teacher's Desk location refer to Drawing E001 for all requirements.

C. Provide at Smartboard Interactive Monitor Wall Station, refer to Drawing E001 Legend for all requirements.

D. For Data, Telephone and combination Telephone/Data refer to Drawing E001 Legend for all requirements.

2.6 FIRE STOP FITTINGS

A. Flame stopper providing fire stopping to existing through-wall cable penetrations. Up to four hour F and T ratings ensures product will maintain the integrity of fire rated walls whether empty, partially filled or fully loaded. Plenum rated and low air (smoke) leakage.

B. Manufacturer: Nelson Firestop Product, Part No.: Nelson FSP (Putty Bars), Nelson CLK (Silicone Sealant), Nelson LBS (Latex Sealant), Nelson ES1399 (Elastomeric Sealant) or approved equal.

2.7 EQUIPMENT RACKS, CABLE PATHWAYS AND CABLE MANAGEMENT

A. 7' Height (45RU) Cable Management Rack. All 14 gauge steel construction. Color black. Provide all mounting hardware as required. Bond to grounding bus bar.
Manufacturer: Mid Atlantic R4 Series, R412-4524B

B. 7' Height Vertical Cable Manager w/ Door. 6" width. Color black.
Manufacturer: Mid Atlantic VCD-6-45-DC

C. Horizontal cable management panels. Color Black.
Manufacturer: Mid Atlantic Part No.: HCM-1D (1 RU), HCT-2 (2RU)

D. Ladder rack. 12"W. 12" rung-spacing. Steel construction. Color black. Provide all mounting hardware as required. Bond to grounding bus bar.
Manufacturer: Chatsworth Products, Inc. Part No.: 10250-712 or approved equal.

E. Surface-mount raceway. Steel construction. Used to contain data/telephone cabling within classrooms when cabling cannot be concealed. No cabling shall be run exposed. Provide bends and all required and necessary accessories. Color white. Manufacturer: Wiremold Model No.:700WH or approved equal.

F. Surface-mounted raceway. Steel construction. Used to contain power and data/telephone cabling within classrooms when cabling cannot be concealed.. No cabling shall be run exposed. Provide bends and all required and necessary accessories. Color white.
Manufacturer: Wiremold: Model No.:4000WH or approved equal.

G. Deep Single Gang Surface-mount receptacle box when installed on existing wall. Steel construction. Use in classrooms or Offices for data/ telephone. Color white
Manufacturer: Wiremold Model No.: 5744 WH or approved equal.

H. Radius drop for ladder rack. Color black.
Manufacturer: Chatsworth Products, Inc.
Part No.: 12100-712(Cross-member), 12101-701(Stringer) or approved equal.

I. Cable-retaining posts for ladder rack. Color black.
Manufacturer: Chatsworth Products, Inc., Part No.: 10596-706 or approved equal.

J. Velcro-type cable ties. Lengths as needed. Plenum-rated.
Manufacturer: Ortronics., Part No.: OR-70700143 (8"), OR-70700144 (12") or approved equal.

K. "J" Hooks. Suitable for attachment to beam flanges, "U" channel, purlings, deck plates, smooth or threaded rod and designed for Category 6 cabling. For use as a cable support in ceilings.
Manufacturer: Erico, Arlington Industries, B-Line Part No.: As Required or approved equal.

L. All conduit riser, drops and conduit run for Rapid Cable shall have a drag wire left in place for future use.

2.8 GROUNDING COMPONENT

A. Cabinet and Rack grounding kit. Complete kit for new installation.
Manufacturer: Panduit, Part No.CGK630U or approved equal.

B. Jumper Kits. Manufacturer: Panduit, Part No.: CGJ620U(for M6 Rail), CGJ620UC(for thru-hole Rail), CGJ5620UB(for Cage Nut Rail), RGEJ1057PFY (for equipment) or approved equal.

2.9 LABELS

A. Labels. Self adhesive, self laminating, with white matte finish printing area, clear plastic shield. Pin feed for machine printing. Used for cable identification. Labels shall be provided on both ends of all cables. 1" width for horizontal cabling, 2" width for riser cabling. Length as required for other cable media.
Manufacturer: W. H. Brady Co. Type: 1" Width for horizontal cabling, 2" Width for riser cabling and length as required for other cable media or approved equal.

B. Labels. White polyester. Laser printable for use on face plates. 1" x 4". Coordinate label placement with Owner.
Manufacturer: W. H. Brady Co., Part Number: CL-211-619 or approved equal.

C. Labels. White Polyester. Laser printable. For use on patch panels. 3/4" x 1/4", 1" x 1/2".
Manufacturer: W. H. Brady Co., Part Number: CL-041-619 (0.75" x 0.25") or approved equal.

D. Labels. White polyester. Laser printable. Used for cable ladders, racks, frames, etc., as required.
Manufacturer: W. H. Brady Co., Part Number: BCDAT-2-619 or approved equal.

E. Labels. Paper label inserts for 110 blocks. Utilize EIA 606 compliant colors.

Manufacturer: W. H. Brady Co.
Part Number: DATA-177-124-BL – Blue – Data Cables
Part Number: DATA-177-124-RD –Purple – VIOP
Part Number: DATA-177-124-WT – White – Wireless Access Point
Part Number: DATA-177-124-PK – Pink – Security
Part Number: DATA-177-124-YL –Yellow – Misc. riser
Part Number: DATA-177-124-GR –Green – PBX Termination
Or approved equal.

F. Confirm all labeling methods with Owner before the start of any work.

PART 3 - EXECUTION

3.1 GENERAL

A. Follow manufacturers' instructions for installing all telecommunications cabling. Where instructions are unavailable, follow approved industry practice.

B. Compare communications drawings and specifications with the drawings and specifications of other trades, report any discrepancies to the Consultant; and obtain written instructions for changes necessary in the work. Include most stringent requirements in bid.

C. Repairs or changes caused by contractor's neglect shall be made at contractor's expense. Protect finished work of other trades from damage or defacement and remedy any damages as required.

D. Clean up all debris generated by installation activities and discard as directed by the Construction Manager.

E. Maintain a current copy of this Specification and related Drawings at the job site at all times.

3.2 CABLE DISTRIBUTION

A. Follow room boundaries when pulling cables through ceilings for distribution into walls, conduits, wiring channels, outlets, etc.

B. All cable distribution from the Data Closet/Rack to all work locations (except as noted) shall be run in the ceiling plenum. Ceiling support grids and service hangers shall not be used to support cabling.

C. Cable shall be loose bundled into cable supports. Use only approved re-enterable cable ties to secure cables in overhead distribution.

3.3 EMI/RFI AVOIDANCE

A. To avoid electromagnetic interference (EMI) route cables to maintain the following minimum distances:

1. Twelve inches from lighting fixtures.
2. Thirty-six inches from electrical lines of 5 KVA or greater.
3. Forty inches from transformers or motors.

B. Maintain minimum twelve-inch separation between telecommunication cables running exposed in ceiling and parallel electrical cables/conduits.

C. Telecommunication cables shall cross electrical cables/conduits only at 90 degree angles.

3.4 STAFFING

A. Designate a qualified foreman. The foreman shall be present in the field at all times during the performance of the work.

B. Provide a supervisory work force sufficient to maintain efficient performance of the contractor's responsibilities.

C. Use only skilled and reliable work force and discontinue the services of anyone employed on this project upon written request by the Owner, Architect, Construction Manager or Consultant.

D. Use personnel who are qualified (at minimum) to perform all of the installation and testing work activities required under the contract.

E. Provide and use the proper tools in good working order for the performance of the work. The Consultant reserves the right to review the tools and tool maintenance procedures of the contractor and require replacements to be obtained.

F. Telephone and data industry cable installation standards, TIA/EIA and BICSI standards, and manufacturers' instructions shall be used for in-process quality control and final acceptance of the work.

G. All workers entering work site shall require valid Identification which shall be run through National database before entering work site.

3.5 CABLE SLACK

A. Provide a minimum of 12-inches of slack at each terminal box or behind each faceplate after jack installation is completed to allow for easy dismounting and extension of outlet covers and wire terminations.

B. Provide a minimum of 5-feet slack in a loop in UTP at the head of each stub-up or distribution conduit.

C. Provide a minimum of 10-feet slack in a loop in optical fiber cable at its point of entry to an equipment room.

D. Provide a minimum of 10-feet slack for overhead mounted Wireless Access Point outlets.

E. Provide a minimum of 2-feet slack in Audio/Visual cables above the ceiling near projector location.

3.6 FIRE STOPPING

A. Seal all penetrations through fire rated walls and walls created by or made on the behalf of the contractor so that the original fire rating of the wall is maintained as required by Article 300-21 of the National Electric Code.

B. Use sealant material that has passed fire exposure testing in accordance with standard time-temperature curve in the standard, UL, ASTM E 119, and NFPA 251 and the hose stream test in accordance with UL 1OB.

C. Provide removable fire-stopping pillows (IPC flamesafe sealbags or approved equivalent) in an approved fashion in openings greater than 4" diameter, or 4" x 4" square cross section. Provide wire mesh grate over bags as recommended by manufacturer subsequent to installation.

3.7 CABLE TESTING

A. Test all cables installed under the contract.

B. Pre-installation Inspection

1. Visually inspect all cables, cable reels and shipping cartons for shipping damage. Return visibly damaged items to the manufacturer.

2. Prior to testing, submit for review and approval copies of test report forms proposed for use. Forms shall, at minimum, contain: Project name; Contractor's name; Date of test; Media type and description; Make, model and serial number of the test equipment used and date of last calibration.

C. Post Installation Testing

1. Test only completed systems. Partial or statistically sampled testing is not acceptable, except by prior, written approval from the Consultant.

2. Paired and multi-conductor metallic cables: perform an end-to-end test for continuity, ground fault, shorts and crossed pairs for each cable pair/conductor.

   a. Test cable pairs from the work area outlet, through all conductors to patch board in data closet/rack room.

3. 4-pair Category 6 UTP: in addition to end-to-end tests listed above.

   a. Test for length, capacitance, attenuation, noise, resistance, NEXT, FEXT, ELFEXT, PSNEXT, PSELFEXT and delay skew with injected standard signals. Utilizing automated test equipment, set up and measure a basic link to determine the actual swept frequency ACR. Compare the ACR to the ISO/IEC Cat 6/Class E ACR at 300 or 350 MHz. Test bi-directionally in accordance with ANSI/TIA/EIA-568-( ).
   b. Test cabling not cross connected or patched within the closet as a permanent link.

4. For 4-pair replace the entire cable if a bad pair or conductor is found.

5. For Audio/Visual replace the entire cable if any defects are found.

6. Remove defective cable in its entirety from point to point. Do not abandon cables in place.

7. The Consultant reserves the right to observe the conduct of any or all portions of the testing process and to conduct, and to require the Contractor, using the Contractor's equipment and labor, a random re-test of up to five (5) percent of the cable plant to confirm documented test results.

8. Document all test results and corrective procedures and submit to the Consultant within ten (10) working days of test completion.

9. In addition to the actions specified above, the contractor may be required to be present while the owner or owner's designated representatives conduct performance tests of the transport electronics connected to the cabling system.

3.8 ACCEPTANCE

A. Once testing has been completed, both as-built and testing documentation have been delivered to the Consultant, and the Consultant is satisfied that all work is in accordance with the contract documents, the Consultant shall notify the contractor in writing of the acceptance of the work performed. The date of this acceptance shall constitute the commencement of the warranty period.

3.9 CABLE IDENTIFICATION SYSTEM

A. Use color coding in accordance with the EIA-606 standards.

B. Jacks, faceplates and wall outlets at the user locations, termination blocks and individual lateral cables shall be labeled with (at minimum) machine generated black uppercase lettering on a permanent adhesive label stock, covered with a permanent water resistant sealer. Labeling stock and/or lettering must be used that provides a high contrast with the color of the terminating equipment, faceplate or cable.

C. Place labels on both ends of the cable at least 4 inches from the point at which the cable is terminated on the connector or terminal block.

D. Provide permanent, machine generated cable tags. Temporary tags are acceptable only during construction. Label each tag with the appropriate cable number as shown on the drawings and as indicated on the cable schedules provided by the Consultant.

E. Cable identification numbers shown on the plans are presented in an abbreviated format. All cables ID's shall (at minimum) indicate the floor, originating closet ID, and the sequential cable number shown on drawings.

F. If at any time during the job the permanent cable tag becomes illegible or is defaced or removed, immediately replace it with a duplicate pre-printed cable tag.

3.10 PANEL IDENTIFICATION

A. Furnish a nameplate for each patch panel, cross-connect field, equipment rack, etc. Unless otherwise noted, use a permanent adhesive label stock, covered with a permanent water-resistant sealer.

3.11 TERMINATING BLOCKS, DISTRIBUTION RACKS AND PATCH PANELS

A. Locate and place all terminating and distribution hardware as shown on drawings.

B. Assemble and install all equipment per manufacturers' printed instructions.

C. Terminate all horizontal Category 6 UTP cables directly on the 110-type termination strips at the rear of rack-mounted 48-port patch panels, unless otherwise noted.

D. Label patch panels and window jack locations.

3.12 CABLE PULLING

A. Do not exceed a pulling tension of 25 lbs. on 4-pair UTP cables.

B. To limit the incidence of micro-bending of the individual fiber strands, use mesh-type, swivel-eye pulling grips for all fiber optic cable pulling. This type of pulling grip is also recommended for all other building cable, as required.

3.13 CABLE INSTALLATION

A. Special Conditions

1. Furnish and install communications cables per the drawings and specifications provided by the Consultant and per manufacturer's recommendations.
2. Install backbone cable as an uninterrupted conductor section from the point of origination to the point of termination as indicated on the drawings, without splices or mechanical couplers between the points of origin and termination.
3. Install each station cable as an uninterrupted conductor section from the data closet/rack to the user-end termination point, as indicated on the drawings, without splices or mechanical couplers between the points of origin and termination.
4. Contractor shall support all backbone cable, data, telephone and all audio/visual horizontal cable bundles on J-hooks. Install J-hooks with the appropriate mounting hardware every 5-feet OC (maximum) for open cable runs. J-hooks shall not be fastened to suspended ceiling support structures, electrical or plumbing piping or any other trade work.
5. Provide all other outlet configurations in accordance with the Drawings.

B. Terminate all four-pair UTP horizontal cables on 4-pair Category 6 jacks. The pinning configuration of the outlet jacks shall be T568B unless otherwise specified by the Owner prior to installation. The jacks shall then be inserted into appropriate faceplates for flush wall mounted receptacles, surface-mounted channels or boxes.

C. Unless otherwise noted, route all data/telephone cable above the finished ceilings, transitioning vertically to wall mounted back boxes and/or surface-mounted wiring channels via conduit stub-ups into the ceiling void as required.

D. Label each outlet and each cable with an appropriate ID number.

E. Provide proper cable bends and supports.

F. Fiber cable terminations shall consist of MTRJ connector and SC connectors. Coordinate with Owner before the start of any work.

END OF SECTION

SECTION 26 0820

AUDIO/VISUAL SYSTEM

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 WORK INCLUDED

A. The work covered by this specification includes the system integration and construction described, including all labor necessary to perform and complete such work; all materials and equipment incorporated or to be incorporated in such work; and all services, facilities, tools and equipment necessary or used to perform and complete such work and all systems configuration, testing and turnover for a fully operational and functioning backbone system.

B. Before the start of any work coordinate all equipment, devices, cable, racks, supports etc. with CM/Owner.

1.2 SCOPE

A. Intent: This specification covers the fabrication, furnishing, delivery, and installation of gymnasium, weight room, band room and choral room and CAD room audio/visual equipment. The form of contract, general conditions, and the project drawings are parts of these specifications.

B. Complete System: The Electrical Contractor using a qualified Audio/Visual Sub-Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated. Any errors, omissions or ambiguities do not relieve the Contractor of this responsibility but shall be brought to the attention of the Architect and/or System Designer for clarification.

C. System Descriptions: The work of this section shall include, but not necessarily be limited to the following:

1. Gymnasium

   a. The sound system electronics shall be housed in a permanent equipment rack and a portable equipment rack located per the contract drawings.
   b. The loudspeaker system shall be zoned to allow for Home, Visitor, and Dual Court usage, loudspeakers to be activated in any combination by recalling DSP presets. Preset recall shall be via rack mount rotary switch in the permanent equipment rack.
   c. The remote rack shall contain the source devices and microphone receivers and shall feed to permanent rack from any of 5 locations specified in the contract drawings.
   d. An Assistive Listening system shall be provided. Contractor shall install and verify compliance with NYS Code Section 1108.2.7 Appendix N Assistive Listening Performance Standards and applicable federal codes.
   e. An interface to the building paging system shall be provided. Functionality of the paging over-ride for normal or e-pages and shall mute the local program.
   f. An audio send/return shall be provided to the new video camera location.
   g. The sound system shall connect to the fire panel and mute automatically upon a contact closure.

2. Weight Room

   a. The sound system shall consist of high-fidelity flush ceiling speakers, a wall mount rack containing a mixer amplifier and a rack plate mounted auxiliary input panel, as shown on drawings.
   b. The sound system shall connect to the fire panel and paging system and mute automatically upon a contact closure. A contact closure from each system shall be provided by others. The secondary of the closures shall attach to the mute input of the mixer amplifier.

3. Band Room

   a. The sound and video system electronics shall be housed in a permanent equipment rack under a table top as located in the contract drawings. The rear of the table top shall have a grommeted pass through to bring cables from the rack to the digital mixing board resting on the table top.
   b. The loudspeaker system shall be a pair of wall mount left / right speakers.
   c. Ceiling-mounted and wireless microphones shall feed the mixing board for recording. One wireless microphone shall feed the sound system directly for use by the teacher. Ceiling mounted microphones for recording shall be provided in the two small practice rooms. Recording shall be accomplished by utilizing the record function built into the mixing board. What to be recorded is selected by muting and unmuting the appropriate microphone inputs on the mixing board.
   d. An HDMI wall plate shall be located in the classroom for video input.
   e. An HDMI cable shall pass through the table grommet from the rack and be available on the table top for general use in the office.
   f. An Aux audio input and Video system button control panel shall be mounted to the office table top located per the contract drawings.
   g. A Smart Board wall-mount, ceiling projector mount and flush motorized ceiling mounted screen shall be provided. The projector and Smart Board shall be Owner Furnished Contractor Installed. The ceiling projector mount and flush motorized ceiling mounted screen will be furnished and installed by the General Construction Contractor. Contractor to coordinate and verify Smart Board, projector and screen mounting locations with the General Contractor and Owner.
   h. An HDMI video matrix shall be provided allowing for any video input to be routed to the display or projector.
   i. An Assistive Listening system shall be provided. Contractor shall install and verify compliance with NYS Code Section 1108.2.7 Appendix N Assistive Listening Performance Standards and applicable federal codes.
   j. The sound system shall connect to the fire panel and mute automatically upon a contact closure.
   k. The sound system shall connect to the paging system via contact closure provided by others and shall drive a logic input in the DSP to actuate a mute during pages.

4. Choral Room

   a. The sound and video system electronics shall be housed in a permanent equipment rack under a table top as located in the contract drawings. The rear of the table top shall have a grommeted pass through to bring cables from the rack to the digital mixing board resting on the table top.
   b. The loudspeaker system shall be a pair of wall mount left / right speakers.

c. Ceiling-mounted and wireless microphones shall feed the mixing board for recording. One wireless microphone shall feed the sound system directly for use by the teacher. Recording shall be accomplished by utilizing the record function built into the mixing board.

d. An HDMI wall plate shall be located in the classroom for video input.

e. An HDMI cable shall pass through the table grommet from the rack and be available on the table top for general use in the office.

f. An Aux audio input and Video system button control panel shall be mounted to the office table top located per the contract drawings.

g. A Smart Board wall-mount, ceiling projector mount and flush motorized ceiling mounted screen shall be provided. The projector and Smart Board shall be Owner Furnished Contractor Installed. The ceiling projector mount and flush motorized ceiling mounted screen will be furnished and installed by the General Construction Contractor. Contractor to coordinate and verify Smart Board, projector and screen mounting locations with the General Construction Contractor and Owner.

h. An HDMI video matrix shall be provided allowing for any video input to be routed to any display.

i. An Assistive Listening system shall be provided. Contractor shall install and verify compliance with NYS Code Section 1108.2.7 Appendix N Assistive Listening Performance Standards and applicable federal codes.

j. The sound system shall connect to the fire panel and mute automatically upon a contact closure.

k. The sound system shall connect to the paging system via contact closure provided by others and shall drive a logic input in the DSP to actuate a mute during pages.

5. Digital Arts CAD Room 306

a. The sound and video system shall not utilize an equipment rack. The audio amplifier shall mount above the projector and receive audio from the projector's aux audio output and shall self-manage power by automatically turning off when no signal is present.

b. The loudspeaker system shall be ceiling tile mounted speakers.

c. An HDMI wall plate shall be located in the classroom for video input and wire directly to the projector.

e. A ceiling projector mount and flush motorized ceiling mounted screen shall be provided. The projector shall be Owner Furnished Contractor Installed. The ceiling projector mount and flush motorized ceiling mounted screen will be furnished and installed by the General Construction Contractor. Contractor to coordinate and verify projector and screen mounting locations with the General Construction Contractor and Owner.

f. The sound system shall connect to the fire panel and paging system and mute automatically upon a contact closure by interfacing with the amplifier remote volume control input. A contact closure from each system shall be provided by others. The secondary of the closures shall attach to the amplifier.

g. A Video system button control panel shall be wall mounted to for system control.

6. Assistive Listening Systems

a. Assistive Listening Systems shall be installed in compliance with New York State Building Code Supplement of July 2017, Appendix N, Section N104.1.

1.3 RELATED WORK

A. Electrical line voltage connections, conduit, boxes and wiring of any type, by others.

B. General construction work as specified.

1.4 GENERAL REQUIREMENTS

A. Field Conditions: All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date

B. Safety: The systems shall conform to all applicable code requirements and shall be in conformance with industry standards of operation and practices. All materials, arrangements, and procedures shall comply with applicable code requirements, allowing the users to arrange and operate a safe assembly and working environment for audience and user personnel.

1.5 QUALITY ASSURANCE

A. Requirements: The Audio/Visual Contractor shall have been installing audio/visual systems for a period of five years or more and shall have completed at least ten installations of this type and scope. The System Designer shall be the final judge of the suitability of experience.

B. Manufacturer Qualifications: In business for 5 years or longer manufacturing commercial-duty sound products. Franchise suppliers for supply, installation and maintenance of manufacturer's products and provide supplier support services, to include service and maintenance manuals, schematic information and parts lists, factory stock of replacement parts, and factory repair service. Provide standard products used in similar installations that have been available for installation for period of 2 years or more unless otherwise specified.

1.6 SUBMISSIONS

A. Bill of Materials: Bidders shall supply a complete bill of materials with their bids, identifying equipment and quantities being offered.

B. Drawings: Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation. They shall be approved by the System Designer before beginning any fabrication, installation, or erection. Such approval does not relieve the Audio/Visual Contractor of the responsibility of providing equipment in accordance with the specifications.

C. Catalog Cuts: In lieu of drawings, the Contractor may submit catalog cuts for standard equipment items. These must contain full information on dimensions, construction, applications, etc. to permit proper evaluation. In addition, they must be properly identified as to their intended use. Any options or variations must be clearly noted.

1.7 INSTRUCTIONS

A. Upon completion of the work, the Audio/Visual Contractor shall submit 3 copies of a detailed Operating and Maintenance Manual including as-built shop drawings, equipment descriptions, and parts lists. The Audio/Visual Contractor shall go through the manual with personnel designated by the owner to demonstrate and explain the maintenance and operation of the systems, 2 hrs. per system minimum.

B. Basic operating instructions shall be posted in the area where the equipment will be operated.

1.8 WARRANTY

A. The Audio/Visual Contractor shall provide a one year written guarantee against defects in materials or workmanship starting from the date of acceptance of equipment by the Owner's representative. The guarantee shall not cover damage due to normal wear and tear, acts of nature, neglect, or improper use of equipment. Any required maintenance or replacement shall be provided by the Audio/Visual Contractor within thirty days of notification by the Owner except for safety related items, which shall be corrected within 48 hours of notification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified system based on equipment manufacturers as listed or approved to establish required level of quality and performance.

2.2 GENERAL

A. Loudspeakers. Apogee Sound International or approved equal.

1. Contractor will be responsible for the safe and secure suspension of all loudspeaker devices

2. Only manufacturer approved rigging hardware will be attached to speakers.

3. Safety ratios of at least 5:1 shall be maintained by all materials used in the suspension of speakers.

4. Finish for all speakers, components and mounting hardware shall be white.

5. Refer to plans also for various equipment locations and types

6. The contractor shall be responsible for hiring the services of a licensed rigger to mount and suspend all flown loud speakers. Submit plans and all details of mounting system to architect for review and approval

B. All wireless antennas shall be remoted per the manufacturer’s recommendations for optimal reception/transmission with coax-cable as recommended by the manufacturer for the distance.

C. Line and Microphone cable shall be 20 AWG insulated, twisted pairs of stranded copper wire. Each pair will be shielded with foil, spiral, or braided shield providing 100% coverage of inner conductors.

D. Speaker cable shall be 14 AWG for distances under 50’ and 12 AWG for distances greater than 50’.

F. DC and control cables will be copper conductors appropriately sized for current and voltage requirements in accordance with the NEC.

2.3 EQUIPMENT

	Gym Fixed Rack		
Qty	**Item**	**Manufacturer**	**Notes**
8	AFI-3W	Apogee Sound	Bleacher Speakers
8	AFI-3 Horizontal Yoke	Apogee Sound	
8	AFI-2s2	Apogee Sound	Court Speakers
8	AFI-2 Yoke	Apogee Sound	
3	CA-8000D	Apogee Sound	Amplifier
1	CORE 8x8	Bogen	System Mixer / DSP
1	RAC5	Bogen	Remote Volume and Preset Selector
1	LS-55-072	Listen Technologies	Assistive Listen System Package
14	LR-4200-072	Listen Technologies	Additional Receivers
14	LA-401	Listen Technologies	Additional Headphones
14	LA-430	Listen Technologies	Additional Neck Loops
5	D-J1	RDL	XLR Input Plate
1	D-CIJ3	RDL	Aux Line Input Plate
1	RM-D3	RDL	Rack Mount Decora Plate with 3 Inserts
1	D-XLR2	RDL	M/F XLR Wall Plate
2	PL-PRO-C	Furman	Power Distro with Lights, Rack Mount
1	D4LK	Middle Atlantic	4 RU Rack Drawer
1	SR-24-28	Middle Atlantic	Wall Mount Rotating Rack
1	VFD-24	Middle Atlantic	Locking Front Door
2	FL-500P-6-B	FSR	Floor Box

	Gym Portable Rack		
Qty	**Item**	**Manufacturer**	**Notes**
3	SKM 100-835 G3	Sennheiser	Hand Held Wireless Mic
1	EW 152 G3	Sennheiser	Head Worn Wireless Mic
1	ASA 1/NT	Sennheiser	Antenna Combiner
1	DDU250	Bogen	Announcer Mic, Desk, Push To Talk
1	D-300Z	Denon	CD/USB/Tuner/Aux
1	D-CIJ3	RDL	Aux Line Input Plate
1	DCR-1x1	Chief	Rack Mount Single Opening Decora Plate
3	SF4	Bogen	Weighted Base Mic Stand
1	PL-PRO-C	Furman	Power Distro with Lights, Rack Mount
1	G-PROR-8U-19-8U	Gator	8RU Portable Rack

	Weight Room		
Qty	**Item**	**Manufacturer**	**Notes**
4	HFCS1	Bogen	Ceiling Speaker, 70V, 32 Watt Tap
4	TBCR	Bogen	Tile Bridge
4	CK10	Bogen	Safety Cable
1	V250	Bogen	Mixer Amplifier
1	LMM1S	Bogen	Input Module, Set Jumper to Line Input
1	RPK87	Bogen	Mixer Rack Mount Kit
1	DB-CIJ3	RDL	Aux Input Plate
1	DCR-1X1	Chief	1 RU Rack Panel for 1 Decora Device
1	40612	C2G	1.5' RCA to 3.5mm
1	EWR-8-17	Middle Atlantic	Small Wall Mount Rack
1	PDF8	Middle Atlantic	Plexiglass Locking Rack Door
1	D4LK	Middle Atlantic	4 RU Rack Drawer
1	EVTA-1	Middle Atlantic	1 RU Perf Blank Rack Panel

	Band Room		
Qty	**Item**	**Manufacturer**	**Notes**
2	AFI-1s2 White	Apogee Sound	Main L/R Speakers
2	MM-022-BT	Allen Products	Speaker Mount
1	CA-8000D	Apogee Sound	Amplifier
1	CORE 12x4	QSC	Recording Mixer
1	HD 280 Pro	Sennheiser	Headphones
1	128 GB USB 3.0 Type A Thumb Drive	SanDisk	Memory for Recording
2	D-CIJ3D	RDL	Audio Aux Input Wall Plate
1	DC-2G	RDL	Desk Top Decora Box for Audio Aux In and Video Control Panel
1	CORE 12x4	Bogen	Mixer/DSP
3	SKM 100-835 G3	Sennheiser	Hand Held Wireless Mic
1	EW 152 G3	Sennheiser	Head Worn Wireless Mic
1	ASA 1/NT	Sennheiser	Antenna Combiner
9	ES931PMWH	Audio Technica	Hanging Microphone
1	DDU250	Bogen	Desk Mic, Talk Back
3	SB6	Bogen	Mic Stand with Boom
1	D-300Z	Denon	CD/USB/Tuner/Aux
1	LS-55-072	Listen Technologies	Assistive Listen System Package
1	PL-PRO-C	Furman	Power Distro with Lights, Rack Mount
1	Power Lite 1985WU	Epson Pro	Projector, WUXGA, 4k Lumen
1	VCMU	Chief	Projector Mount
1	Tensioned Contour Electrol	Da-Lite	Screen, 16:10, 87x139 with HD Progressive .9 Screen and Wall Switch
1	NS801W	Hubbell	HDMI Wall Plate

2	PT-580T	Kramer	HDMI over Cat6 Transmitter
2	TP-580R	Kramer	HDMI over Cat6 Receiver
1	VS-42-UHD	Kramer	4x2 HDMI Video Matrix
1	FC-46xl		HDMI Audio De-embedder
1	RC78-R	Kramer	Wall System Control Panel
1	CWR-12-22PD	Middle Atlantic	Locking Rack, Free Standing Under Desk

	Choral Room		
Qty	**Item**	**Manufacturer**	**Notes**
2	AFI-1s2 White	Apogee Sound	Main L/R Speakers
2	MM-022-BT	Allen Products	Speaker Mount
1	CA-8000D	Apogee Sound	Amplifier
1	CORE 12x4	QSC	Recording Mixer
1	HD 280 Pro	Sennheiser	Headphones
1	128 GB USB 3.0 Type A Thumb Drive	SanDisk	Memory for Recording
2	D-CIJ3D	RDL	Audio Aux Input Wall Plate
1	DC-2G	RDL	Desk Top Decora Box for Audio Aux In and Video Control Panel
1	CORE 12x4	Bogen	Mixer/DSP
3	SKM 100-835 G3	Sennheiser	Hand Held Wireless Mic
1	EW 152 G3	Sennheiser	Head Worn Wireless Mic
1	ASA 1/NT	Sennheiser	Antenna Combiner
4	ES931PMWH	Audio Technica	Hanging Microphone
1	DDU250	Bogen	Desk Mic, Talk Back
3	SB6	Bogen	Mic Stand with Boom
1	D-300Z	Denon	CD/USB/Tuner/Aux
1	LS-55-072	Listen Technologies	Assistive Listen System Package
1	PL-PRO-C	Furman	Power Distro with Lights, Rack Mount
1	Power Lite 1985WU	Epson Pro	Projector, WUXGA, 4k Lumen
1	VCMU	Chief	Projector Mount
1	Tensioned Contour Electrol	Da-Lite	Screen, 16:10, 87x139 with HD Progressive .9 Screen and Wall Switch
1	NS801W	Hubbell	HDMI Wall Plate
2	PT-580T	Kramer	HDMI over Cat6 Transmitter
2	TP-580R	Kramer	HDMI over Cat6 Receiver
1	VS-42-UHD	Kramer	4x2 HDMI Video Matrix
1	FC-46xl		HDMI Audio De-embedder
1	RC78-R	Kramer	Wall System Control Panel
1	CWR-12-22PD	Middle Atlantic	Locking Rack, Free Standing Under Desk

	Digital Arts CAD Room 306		
Qty	**Item**	**Manufacturer**	**Notes**
4	HFCS1	Bogen	Ceiling Speaker, 70V, 32 Watt Tap
4	TBCR	Bogen	Tile Bridge
4	CK10	Bogen	Safety Cable
1	SPA2-60	QSC	Power Amplifier
1	VCMU	Chief	Projector Mount
1	Tensioned Contour Electrol	Da-Lite	Screen, 16:10, 87x139 with HD Progressive .9 Screen and Wall Switch
1	NS801W	Hubbell	HDMI Wall Plate
1	RC78-R	Kramer	Wall Controller
1	DR-PCB-H2.0-10M	FSR	HDMI Extension Cable

PART 3 - EXECUTION

3.1 GENERAL

A. Standards

1. Conduit: Use separate steel conduits for microphone level circuits (below -20 dBm), line-level circuits (up to +30 dBm), loudspeaker circuits (above +30 dBm), control lines, and AC power circuits. Space audio conduits well away from the power conduit system. Insulate all conduits from the equipment rack; ground conduit only to power system ground.

2. Cable: Do not exceed 30 percent fill or splice lines in conduit. Connect each input receptacle by individual, insulated line to system equipment rack. Exercise care to avoid damage to cables and equipment. Do not splice lines in conduit. Provide all microphone and loudspeaker wiring in continuous runs without intervening splices.

3. System Shielding and Grounding: Ground each shield at only one point. Insulate shields the floating end with heat-shrink or wedge-on collars. Connect all audio grounds to isolated grounding bus bar in equipment rack. Ground this point and track to building main service ground point using ground cable sized for DC resistance of 0.1 ohm or less. Use isolated ground receptacles for all audio system power. Connect these receptacle grounds together and terminate them only to equipment rack ground.

4. Connectors: Terminate three-pin/socket connectors for Pin 1 = shield, Pin 2 = high, Pin 3 = low. For ¼" trs S= SHIELD R= LOW T= HIGH Make all joints and connections with rosin core solder or approved mechanical connectors.

5. Provide all wiring in strict conformance with standard broadcast practices. Dress cables in conveniently sized bundles of cables, combed into parallel runs, either laced or banded with sufficient plastic ties. Cabling to each piece of equipment neatly incorporates "service loop" of sufficient length to permit equipment to be pulled forward from rack for servicing. Cables and cable bundles supported with sufficient plastic ties and support bars to ensure that strain is not placed on any connections or connectors. Cables and cable bundles behind patch bays sufficiently well organized to permit easy access to patch panels to add or remove cables.

6. Receptacles: Location: Locate wall-mounted receptacles in metal boxes at building standard receptacle height unless otherwise indicated. Locate floor-mounted receptacles in flush floor boxes with flush lids. Locate catwalk-mounted receptacles in metal boxes mounted on catwalk hangers at building standard receptacle heights.

7. Receptacles: Mounting: Attach three-pin/socket connectors to mounting plates with machine screws unless using single-hole mounting types with threaded sleeve and mounting index to prevent rotation. Install 1/4-inch phone jacks to mounting plates with insulating washer and sleeve to electrically isolate jack from electrical box and conduit.

8. Coordinate exact receptacle locations in field with Owner prior to installation.

9. Labels: Label all equipment items, device plates, equipment rack panels, devices, receptacles and cables, and all controls not protected by security covers as to function performed and area served.

10. Identify all wires and cables at every termination and connection point. Place cable markers within 6 inches of each termination. Use identical designations at each end of cable and carry designations through any intermediate terminations. Protect all cable markings beneath clear heat-shrink.

11. Label manufactured equipment items as to their function and all unsecured controls as to areas and receptacles served. Employ panels with black or colored background to match finish of equipment item and white contrasting engraved Helvetica lettering. Mark nominal operating positions of all unsecured controls.

12. Equipment Racks: Install equipment in rack to permit access to all equipment for service. Do not allow transformers, relays, terminal blocks mounted in rear of rack behind other equipment to prevent access to other equipment connections or mounted on hinged panels to permit access.

13. Arrange equipment to prevent temperatures from rising above 100 degrees Fahrenheit with ambient room temperature of 70 degrees F. Use ventilating panels as required.

14. Connect all microphone, line, loudspeaker level and DC control cables to equipment rack using specified terminal blocks. Label screw positions as to cable served and conductors of that cable. External lines connected to patch bays terminated directly to patch bay terminal blocks.

15. Fill all unused rack space with black blank or vent panels.

16. Electronic Equipment Cabinet: Coordinate with Architect and Owner exact location of equipment cabinet in backstage area and exact location of conduit systems and AC receptacles required.

17. Speaker Installation: Speaker clusters to be able to pan/tilt a minimum of 40 degrees on both the X and Y axis. Wall or ceiling affixed speakers to have a tilt range of 45 degrees.

18. Use chains or direct beam clamp to beams where possible in final hanging of Gym Speakers, incorporate secondary safety wire.

19. PA system to override speaker system, coordinate with current/ new PA systems.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided with manufacturers equipment information to obtain mounting heights of specified and indicated items on drawings, in the field.

3.3 GROUNDING AND SHIELDING

A. Electrical Connection
1. All audio equipment will derive power from dedicated circuits not shared with other equipment.

B. Rack Ground Buss
1. Each rack will contain a ground buss bar to which equipment chassis will be connected via 12 gauge insulated conductor.

C. Shield Termination
1. Transformer or differential balanced inputs and outputs will be maintained wherever possible.
2. Audio equipment shields will be connected at equipment outputs.
3. Shield connections will be maintained through intermediate termination devices such as patchbays and punch blocks.
4. Shields must be disconnected at equipment inputs, with this exception: Microphone inputs will always maintain shield continuity from microphone through to console or mic preamp inputs.

3.4 SYSTEM PERFORMANCE TESTS AND ADJUSTMENTS

A. Initial Post-Completion Tests and Adjustments

1. Loudspeaker Polarity
   a. Inspect loudspeaker line polarities with phase checker or with multimeter and DC signal source. Polarize all loudspeaker liens identically with respect to color-coding.
   b. Inspect high frequency loudspeaker polarities with respect to one another with phase checker and bring all units into common polarity. Confirm appropriateness of polarization through listening tests using speech and music program material. Move slowly from coverage of one high frequency loudspeaker to next with loudspeakers connected in and out of polarity. No degradation of program material should be heard in overlap zone with loudspeakers in proper polarity. Similarly inspect and set polarities of high frequency and low frequency loudspeakers, reversing polarity and one frequency range to confirm initial observations. Restore initial polarities as appropriate.

2. Equalization / DSP Programming: All Digital Signal Processors shall be programmed with the loudspeaker manufacturers recommended equalization setting as a room tuning starting point. Protective limiters shall be set to insure over powering of the loudspeakers is not possible. Limiters should not engage at normal operating levels. Measure system acoustical performance using calibrated ANSI standard type 1 or IEC precision sound analyzer set for “slow” meter damping except as otherwise noted, and flat response with random incidence at 4 to 5 feet height. Adjust using parametric equalization. Filers should be cut only. Ensure all interior finishes and furnishings are in place, and system gain is adjusted to provide levels of 70 to 80 dB and at least 10 dB above background noise at measuring locations for these tests, except as otherwise noted. Response curves directly recorded from calibrated real time analyzer. Point-by-point measurements, averaging estimates, and other non-real-tin dynamic measurements not acceptable. Include following tests and adjustments in equalization process:

3. Feedback Corrections
   a. Connect microphone into sound system, and place in normal operating position closet to loudspeaker system. Adjust sound system gain until it reaches regeneration (feedback). Determine frequency of regeneration by observing response of real time audio spectrum analyzer and adjust appropriate filter until observed regeneration ceases. Continue procedure until the required potential acoustic gain (PAG) is achieved. Record resulting acoustic response of sound system and record electrical response of equalizer. Document control settings used to achieve this response.

4. Uniformity of Coverage
   a. Measure and record acoustic distribution of loudspeakers in sound system throughout entire seating area. Record location of all positions in seating and where any 1/3-octave band from 250 to 5000 Hz, deviates more than +/- 3 dB from desired curve.
   b. Re-adjust loudspeaker aiming as required to optimize coverage uniformity.

5. Maximum Output Level
   a. Measure and record maximum output level of system, using standard “fast” meter damping and employing wideband-recorded music at test signal. System should be capable of providing 90 dB SPL in audience area on axis of any high frequency loudspeaker.

6. Buzzes, Rattles and Other Noises
   a. Apply slow, sine-wave sweep from 50 to 5000 Hz at level to produce amplifier outputs to 6 dB below their nominal ratings. Listen carefully for buzzes, rattles and other noises. Correct all defects in system. Advise of any noises that are clearly external to system.

7. Gain Control Settings
   a. Establish tentative normal settings for all gain controls after adjusting all gain controls for optimum signal-to-noise ration and signal balance. Record settings.

8. Freedom from Switching Transient Noise
   a. Eliminate audible clicks or pops produced by operation of any controls.

9. Listening Test
   a. Listen to normal program material, including both speech and music, at both normal and at maximum volume levels to be sure that there are no remaining defects.

10. Control Systems
    a. Program and label all button panels and control panels for control over power, source selection, video routing and screen control for all devices connected per the contract drawings.

11. Video Systems
    a. Calibrate projectors and displays for Black Level, White Level, Saturation/Chroma, Hue and Sharpness.
    b. Program and label all button panels and control panels for control over power, source selection, video routing and screen control for all devices connected per the contract drawings.

3.5 DEMONSTRATION AND ACCEPTANCE TESTING

A. Demonstration: Demonstrate operation of each major component and of complete installation following approval of test report and at time mutually agreed upon by Architect/Engineer, Owner's representative and contractor responsible for installation of sound system.

B. Acceptance Tests: Assist as required during acceptance tests and adjustments that follow demonstration. Provide all labor, materials, tools, and measurement equipment necessary for those tests and adjustments, except as otherwise specified. Ensure contractor's representative assisting in performance of these tests is thoroughly familiar with all details of system and include field supervisor in overall charge during course of installation work. Budget 4 working hours for performance of these tests and adjustments. If final acceptance is delayed beyond this period because installation is not in accordance with specified requirements, pay for all additional time and expenses of Architect/Engineer and Owner's representative during any resultant extension of acceptance testing period.

C. Listening Tests

1. Assist subjective evaluation of system by observers listening at various positions under various operating conditions, using speech, music, and liver or recorded materials.

D. Equipment Tests

1. Perform any measurements of frequency response, distortion, noise of other characteristics and any operation tests deemed necessary by Architect/Engineer or Owner's representative to determine conformance of system and its installation with specified requirements. Make any adjustments to system or its installation required to ensure system operates properly as directed by Architect/Engineer or Owner's representative. This may include, but is not limited to, changes to equalization or level balance, and changes to or installation of resistive pads and RC networks. Record final control settings and final values of any installed components.

E. Training

1. In addition to demonstration specified above in “Demonstration and Acceptance Testing” Prime Contractor provides 3 separate 2-hour training sessions by experienced audio and video engineer on 1 month intervals, covering general system operation, maintenance requirements and techniques.

3.6 INSTALLATION

A. The Audio/Visual Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.

B. Extent: All specified equipment shall be installed by fully trained personnel. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be adjusted for the most efficient operation, the greatest safety and for the best visual appearance.

C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes.

3.7 CLEAN UP

A. The Contractor shall be responsible for clean-up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.8 INSPECTION AND TESTING

A. Inspection: During the installation of equipment the Audio/Visual Contractor shall arrange for access as necessary for inspection of equipment by the Owner's representatives.

B. System Pre-Testing by Audio/Visual Contractor: On completion of installation and testing the Audio/Visual Contractor shall conduct a complete pre-test of the system to ensure it is working properly and in conformance with this specification. This shall include a complete test of all electrical systems and components. All tests shall be conducted as if the Architect or Consultant were present and appropriate corrections made before the final inspection.

C. Special Testing: If specifications, the Architect's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Audio/Visual Contractor shall give the Architect and the System Designer timely notice of its readiness for inspection, and of dates of inspections to be made by other authorities.

D. Completion Testing: Upon completing the installation of all equipment specified under this section, the Audio/Visual Contractor shall notify the Architect and the System Designer, who will schedule an inspection. At the time of inspection, the Audio/Visual Contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by the Owner's representative. Any equipment, which fails to meet with approval, shall be repaired or replaced with suitable equipment and the inspection shall be re-scheduled under the same conditions as previously specified. At the time of these inspections, no other work shall be performed in the auditorium and stage areas. All temporary bracing, scaffolding, etc. shall be removed to permit full operation of, and access to, all equipment. Final approval will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every particular.

3.9 FOLLOW-UP INSPECTION

A. One year after the completion of installation, the Audio/Visual Contactor shall return to the site and provide the following services:

1. Complete inspection of the Audio/Visual systems.

2. Make all required adjustments.

3. Correct all warranty items.

4. Written recommendations for necessary repairs or changes not included in the warranty.

END OF SECTION

SECTION 26 0825

PUBLIC ADDRESS SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this Section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. The Contractor shall furnish all equipment, accessories and material required for the installation of communication devices in strict compliance with these Specifications and applicable Contract Drawings. Any material and/or equipment necessary for the proper operation of the system, which is not specified or described herein, shall be deemed part of this specification.

PART 2 - PRODUCTS

2.1 SPEAKERS

A. Flush Speaker Baffles (ceiling): Ceiling Speakers shall be Rauland USO-188/ACC1000 white semi-gloss enamel steel grille with 8" speaker, 25/70 volt 7 watt transformer and 6 oz. magnet mounted on a # ACC1101 steel protective cover and an ACC1104 tile bridge support.

B. Surface Square Speaker Baffles (ceiling): Ceiling Speakers shall be Rauland USO-188/ACC1004 white semi-gloss enamel steel grille with 8" speaker, 25/70 volt 7 watt transformer and 6 oz. magnet mounted on a # ACC1102 surface steel square backbox.

C. Clock/Speaker Baffles Flush Mounted(room): The room flush mount clock/speaker/ baffle shall be a Lowell BP-300 combination baffle mounted on a flush backbox PC-312. Speakers shall be a Rauland USO 188 Speaker/Transformer with 8”, 25/70 volt 7 watt transformer and 6 oz. magnet. Clocks shall be XR Wireless clock as indicated in Section 26 0850.

D. Clock/Speaker Baffles Surface Mounted (room): The room surface mount clock/speaker/ baffle shall be a Lowell BP-300 combination baffle mounted on a surface backbox PC-712. Speakers shall be a Rauland USO 188 Speaker/Transformer with 8”, 25/70 volt 7 watt transformer and 6 oz. magnet. Clocks shall be XR Wireless clock as indicated in Section 26 0850.

E. Surface Horn Assembly and Back Box (Gymnasium): Surface mounted Horn Assembly shall be Rauland ACC1411 white epoxy finish on a galvanized, carbon steel baffle. Horn is double re-entrant with built-in driver, 25/70 volt, 16 watt rated mounted on an ACC1113surface mount square backbox with wire guard.

2.2 CALL-IN SWITCH

A. The room call-in switch shall be Rauland No. 2308PC and shall be flush mounted in standard single-gang outlet box. The faceplate shall be brushed aluminum with beveled edges.

END OF SECTION

SECTION 26 0850

XR WIRELESS CLOCK SYSTEM

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this Section. Submit shop drawings for checking and approval.

1.1 GENERAL REQUIREMENTS AND SCOPE

A. Furnish and install a complete new XR wireless clock system using Primex Wireless Inc. XR wireless system.

B. All bids shall be based on the equipment as specified herein. The specifying authority must approve any alternate system.

1.2 SECTION INCLUDES

A. Transmission Systems GPS Receiver Primary Transmitter.

B. Satellite Transmitter.

C. Clocks.

D. Analog.

E. Specifier Note: Edit the following list as required for the project. List other sections with work directly related to this section.

1. Related Sections.
2. Division 26 – Electrical (120 volt grounded outlet required for transmitter).

1.3 REFERENCES

A. This Technical Specification and Associated Drawings Primex Wireless XR Satellite Time System User Manual.

1.4 DEFINITIONS

A. GPS: Global Positioning System, a worldwide system that employs 24 satellites in an integrated network to determine geographic location anywhere in the world, and which employs and transmits Universal Coordinated Time, the world's most accurate and reliable time.

B. UTC: Universal Coordinated Time

C. NTP: Network Time Protocol, used for synchronizing the clocks on computer networks and devices from either a public server or a separate server on a private local area network.

1.5 SYSTEM DESCRIPTION

A. XR wireless clock system shall continually synchronize clocks throughout the facility, and shall be capable of clock readouts in multiple time zones where desired.

B. The system shall provide wireless time from a master time source. This time source will either be the atomic clock on the GPS system or the clock from a defined NTP server that the XR transmitter can access via the customer Ethernet. The master time will be synchronized to UTC. Hard wiring will not be required to the clocks installed for the system. Clocks shall automatically adjust for Daylight Saving Time in locations where DST is observed.

C. Analog Clocks shall be synchronized to within 10 milliseconds 6 times per day, and the system shall have an internal oscillator that maintains plus or minus one second per day between synchronizations, so that clock accuracy shall not exceed plus or minus 0.2 seconds.

D. The system shall include an internal clock reference so that failure to detect the master time source shall not result in the clocks failing to indicate time. Additionally, XR transmitters will have an internal battery backup of up to eight hours in the event of a power failure so that settings and the correct master time will be instantly recalled upon restoration of power.

E. The system shall incorporate a "fail-safe" design so that failure of any component shall not cause failure of the system. Upon restoration of power or repair of failed component, the system shall resume normal operation without the need to reset the system or any component thereof.

F. Clock locations shall be as indicated, and clocks shall be fully portable, capable of being relocated at any time.

G. The system must operate in accordance with a "Radio Station Authorization", Form FCC 601 – LM, granted by the Federal Communications Commission (FCC). This license will be issued to and held by the end user.

1.6 REGULATORY REQUIREMENTS

A. Equipment and components furnished shall be of manufacturer's latest model.

B. The end user will hold a license, known as a "Radio Station Authorization" granted by the FCC.

1. This license grants the end user protected use for wireless transmission at the designated frequency.
2. This license will designate a unique "call sign" for each end user.

C. Transmitter and receiver shall comply with Part 90 of FCC rules as follows:

1. This device may not cause harmful interference, and this device must accept interference received, including interference that may cause undesired operation.
2. Transmitter frequency shall be governed by FCC Part 90.35.
3. Transmitter output power shall be governed by FCC Part 90 257 (b)
4. System shall be installed in compliance with local and state authorities having jurisdiction.

1.7 SUBMITTALS

A. Product Data: Submit complete catalog data for each component, describing physical characteristics and method of installation. Submit brochure showing available colors and finishes of clocks.

B. Operating License: Submit evidence of application for FCC Radio Station Authorization prior to installing equipment. Furnish the license or a copy of the application for the license, to the Owner/End User prior to operating the equipment. The original license must be delivered to the Owner/End User. All Licensing fees shall be paid by this contractor.

C. Samples: Submit one clock for approval. Approved sample shall be tagged and shall be installed in the work at location directed.

D. Manufacturer's Instructions: Submit complete installation, set-up and maintenance instructions.

E. Floor plans indicating the location of system transmitter(s), approved by manufacturer, will be submitted to owner prior to installation.

1.8 SUBSTITUTIONS

A. Proposed substitutions, to be considered, shall be manufactured of equivalent materials that meet or exceed specified requirements of this Section.

B. Proposed substitutions shall be identified not less than 10 days prior to bid date.

C. Other systems requiring wiring and/or conduit between master and clocks will not be accepted.

D. Other systems using wireless technology in an unlicensed frequency range will not be accepted.

E. Other systems using wireless technology where the license is held by any party other than the end user will not be accepted.

1.9 QUALITY ASSURANCE

A. Permits: Obtain operating license for the transmitter from the FCC.

B. Qualifications

1. Manufacturer: Company specializing in manufacturing commercial time system products with a minimum of 30 continuous years of documented experience including 4 years experience producing GPS wireless time systems.
2. Installer: Company with documented experience in the installation of commercial time systems.
3. Prior to installation, a site survey must be performed to determine proper transmitter placement.

1.10 DELIVERY STORAGE AND HANDLING

A. Deliver all components to the site in the manufacturer's original packaging. Packaging shall contain manufacturer's name and address, product identification number, and other related information.

1.11 PROJECT SITE CONDITIONS

A. Clocks shall not be installed until painting and other finish work in each room is complete.

B. Coordinate installation of GPS receiver for access to the roof or exterior side wall so that the bracket and related fasteners are watertight.

1.12 SYSTEM STARTUP

A. At completion of installation and prior to final acceptance, turn on the equipment; ensure that all equipment is operating properly, and that all clocks are functioning.

1.13 WARRANTY

A. Manufacturer will provide a 1 year warranty on all components.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. XR wireless clock system shall be manufactured by Primex Wireless, Inc., 965 Wells Street, Lake Geneva WI 53147 (800) 537-0464 FAX (262) 248-0061 www.primexwireless.com.

2.2 SEQUENCE OF OPERATION

A. Transmitter Operation
When power is first applied to the transmitter, it checks for and displays the software version. It then checks the position of the switches and stores their position in memory. The transmitter looks for the master time source.

B. NTP Time Source
With the XR transmitter in NTP mode, it connects over the Ethernet to the IP address of the NTP server. This IP address is programmed into the transmitter as part of its configuration. Once the connection to the NTP server is acknowledged, it downloads time data and synchronizes its internal master clock to NTP time. The transmitter then starts to transmit its internal time once every second. The transmitter updates its internal clock in this mode once per hour.

C. Analog Clock Operation
Apply power or insert batteries. Follow set up procedures detailed in manufacturer's instructions.

1. After initial setup, the clock will shut off the receiver. Six times each day, the microprocessor will activate the receiver and starting with the stored channel, it will again look for a valid time signal. If necessary, the clocks will resynchronize to the correct time.
2. If the clock has not decoded a valid time signal for a pre-determined number of days, it will go to a step mode. Low battery voltage is a common cause of the clock to not properly decode a time signal. If a clock goes into step mode, replace the batteries first and then determine if the clock synchronizes to master time before attempting other troubleshooting methods.

2.3 EQUIPMENT

A. General: The clock system shall include a transmitter, indicating clocks, and all accessories for complete operation.

B. Transmitter: Primex Wireless Model XR01IN, consisting of a wireless transmitter, surge suppressor/battery backup, and a mounting shelf. Unit shall obtain current NTP time from Ethernet network. The clock system shall transmit time continuously to all clocks in the system.

C. Transmission: Frequency Ranges: 72.020 to 72.980 MHz, 74.610 to 74.790 MHz, 75.210 to 75.390 MHz, 75.440 to 75.600 MHz. Each range is reserved by the FCC for licensed fixed mobile broadcasts.

1. Transmission Power: 1 watt (30dBm) maximum
2. Radio technology: narrowband FM
3. Number of channels: 74
4. Channel bandwidth: 20 kHz maximum
5. Transition mode: one-way communication
6. Data rate: 2 KBps
7. Operating range: 32 degree F to 158 degrees F (0 degrees C. to 70 degrees C).

D. Transmitter

1. Transmitter output power: +26 to +30 dBm
2. Frequency deviation: +/- 4 kHz
3. Transmitter power requirements: 120 VAC 60 Hz
4. Internal power requirements: 5 VDC
5. Carrier frequency stability: +/- 20 ppm
6. Transmitter shall have 74 selectable channels to assure interference-free reception.
7. Transmitter shall have the following switches:
   Time zone adjustment switches for all time zones in the world.
   Includes: Eastern, Central, Mountain, Pacific, Alaska and Hawaii.
8. DIP Switch to allow the following configuration: Daylight Saving Time bypass option, 12-hour or 24-hour display, GPS or NTP time source, Local or LAN configuration, UTC+ or UTC-, 30 minute UTC offset option.
9. Transmitter housing shall be black metal case, 16-3/4 inches (424.4mm) by 12 inches (304.8mm) by 1-7/8 inches (46.4mm) in size.
10. Antenna shall be 46 inches (1168mm) high, commercial type, mounted on top center of transmitter housing. Antenna gain shall be < 2.2 dB. Antenna polarization shall be vertical.

E. Transmitter housing shall incorporate a display which shall include the following:

1. Time readout
2. AM and PM indicator if 12-hour time display is set
3. Day and date readout
4. Time zone indicator including Standard or Daylight Savings Time
5. On screen menu to verify diagnostics, errors, time updates, and switch settings, toggled by sequence of push buttons next to display
6. Status LEDs: Green, which when solid indicates transmitter is broadcasting, yellow which flashes in the event of lack of time update after 48 hours, red which flashes to indicate connection or internal transmitter problem.

F. Internal clock

1. Transmitter shall contain an internal clock such that failure to update time from source will not disable the operation of the clocks.
2. Power supply (included)
   Input: 120 volt AC 50/60 Hz, 0.4 amps.
   Output: 9 volt DC, 1.5 amps.
3. Surge Protector/Battery Backup (included).
   Input: 120 volt AC 60 Hz +/- 1 Hz.
   Output: 120 volt AC, 500VA, 300 watts
   Surge Energy Rating: 365 joules

2.4 ADDITIONAL EQUIPMENT

A. Wireless Receiver Switches: Switches shall receive time packets from the Primary Transmitter and relay the synchronized time to the Satellite Transmitter connected to it. The unit shall include the following:

B. Antenna mounted on top of the switch housing, 11-1/2 inches (292mm) long.

C. Power Supply:
Input 120 VAC 50/60 Hz, 0.4 amps
Output: 9 volt DC, 1.5 amps

D. RS 232 data cable, 5 feet (1.5mm) long

E. Daylight Savings Time Bypass Switch

1. Dimensions: 4-1/4 inches (108mm) long, 5/-3/4 inches (146mm) wide, 1-1/4 inches (31.75mm) deep.
2. Weight: 12 ounces (.34kg)
3. Operating Range: 32 degrees F to 158 degrees F (0 to 70 degrees C)

F. Satellite Transmitters Primex Wireless Model XR01R: Satellite Transmitters shall receive the signal from the Wireless Receiver Switches and transmit the signal to the devices in its vicinity, which are out of the range from the Master Transmitter. The unit shall include the following:

1. Antenna mounted on top of the housing, 46 inches (1168mm) long.
2. Wireless Receiver Switch.
3. Power Supply Input: 120 VAC, 50/60 Hz, 0.4 amps
   Output: 9 volt DC, 1.5 amps.
4. 6 foot (1.83m) cord
5. Surge Suppressor/Battery Backup
6. Mounting Shelf.
7. Transmission Power: 1 watt maximum
8. 72 MHz frequency.

G. Traditional analog clocks (battery): Analog clocks shall be wall mounted. Clocks shall have polycarbonate frame and polycarbonate lens. Face shall be white. Hour and minute hands shall be black.

1. 12-1/2 inch (317.5mm) diameter analog clock: Primex Wireless Model 14155.
2. 16 inch (406.4mm) diameter analog clock: Primex Wireless Model 14163Additional colors, finishes, and dial faces are available from manufacturer.
3. Analog clocks shall be battery-operated, Analog clocks shall be capable of automatically adjusting for Daylight Saving Time. An on-off switch located on the transmitter shall disable this function If desired.
4. Time shall be automatically updated from the transmitter 6 times per day.
5. Analog clocks shall remember the time during changing of batteries.
6. 12.5 inch (317.5mm) analog clocks shall have a tamper proof/theft resistant clock lock mounting slots.

H. Analog clock receivers shall be as follows:

1. Receiver sensitivity: >-110 dBm
2. Receiver power: dual lithium battery pack, supplied by manufacturer.
3. Antenna type: internal
4. Antenna gain: -7 dBd

I. If the transmitter stops transmitting valid time signals due to power failure, the clocks will continue to function as accurate quartz clocks until valid time signal is decoded. If signal transmission is not restored after 96 hours, second hand will “five step” as visual indicator that the signal has been lost. Should the clocks lose power and signal, the clocks will not function.

J. Wire Guards: Provide one for each analog clock as follows:

1. Analog clock wire guard Primex Wireless Model 14123, 18 by 18 inch (457.2 by 457.2mm) size, for 16 inch (406.4mm) Diameter analog clocks. Gym and Cafeteria.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that construction is complete in spaces to receive equipment and that rooms are clean and dry.

B. Verify that 120 volt electrical outlet is located within 6 feet (1.83m) of location of transmitter and the outlet is operational and properly grounded.

3.2 INSTALLATION

A. Provide all equipment necessary for a complete and operable system.

B. Provide one Model Number 14005, 18 inches long, by 3 inches wide by 15 inches deep

3.3 TRANSMITTER

A. Locate transmitter where indicated, a minimum of 2 to 3 feet (.6 to 1 meter) above the floor, away from large metal objects such as filing cabinets, lockers or metal framed walls. Transmitter(s) will be placed at locations indicated below:

1. Primex Wireless Applications Engineering Dept. should be consulted to determine the number and placement of transmitter(s) required for the project. Contact Primex Wireless Technical Support at 1-800-404-8117.
2. If NTP will be used as master time source. Connect CAT5/CAT5e/CAT6 EIA/TIA standard Ethernet cable from transmitter LAN port to available network drop. Set GPS/LAN DIP switch to NTP.
3. The NTP will be the master time source, the network drop used to connect the XR transmitter must have connectivity to the NTP server, which can be verified by the customer IT manager. The default NTP address is time.nist.gov. If the network has a different NTP IP address, it may be programmed into the transmitter by the installer to allow connection to the proper network time. Contact Primex Wireless Technical Support at 1-800-404-8117.
4. Connect antenna to transmitter, using care not to strip threads.
5. Connect power supply to the transmitter.
6. Set the channel number on the display to correspond to the FCC license.
7. Plug power supply into electrical outlet.
8. Analog clocks perform the following operations with each clock:
   a. Set clock to correct time in accordance with manufacturer's instructions.
   b. Observe analog clock until valid signals are received and analog clock adjusts itself to correct time.

B. Install the analog clock on the wall in the indicated location, plumb, level and tight against the wall. If using 12-1/2 inch (317.5mm) clock, attach using clock-lock hanging method and suitable fasteners as approved by clock manufacturer.

1. Analog clocks (AC): Perform the following operations with each clock:
2. Observe clock until valid time signals are received and analog clock adjusts itself to correct time.
3. Install the analog clock on the wall in the indicated location, plumb, level, and tight against the wall. Attach using clock-lock hanging method and suitable fasteners as approved by clock manufacturer.

C. Wire guards: Secure to wall, using approved theft-resistant fasteners.

3.4 ADJUSTING

A. Prior to final acceptance, inspect each clock, adjust as required, and replace parts which are found defective.

3.5 CLEANING

A. Prior to final acceptance, clean exposed surfaces of clocks, using cleaning methods recommended by clock manufacturer. Remove temporary labels from clock faces. Do not remove labels from backs of clocks.

3.6 DEMONSTRATION

A. Provide training to Owner's representative on setting and adjusting clocks, replacing batteries and routine maintenance.

3.7 PROTECTION

A. Protect finished installation until final acceptance of the project.

3.8 TESTING

A. All devices must be tested at their operational location under normal operational conditions to assure reception of signal.

END OF SECTION

SECTION 26 0860

RESCUE ASSISTANCE SIGNAL SYSTEM – AUDIO/VISUAL

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this Section. Submit shop drawings for checking and approval.

1.1 DESCRIPTION OF WORK

A. Section Includes: Furnish, install, and wire all equipment associated with the installation of an Audio-Visual Rescue Assistance Signal System to comply with ADA requirements. This work shall include a main annunciator panel, remote call stations, power supply, outlet boxes, cables and wiring as shown on the drawings and as specified herein.

1.2 SUBMITTALS

A. General: Data sheets on all equipment being provided as well recommended cable types. Internal control cabinet drawings showing internal block diagram connections shall be provided. Wiring diagrams showing typical field wiring connections as well as single line floor plan indicating equipment locations as well as cable routings and quantities.

B. Product Data: Submit product data, including manufacturer's (Spec-Data) product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage and accessories. Include cabling diagrams, wiring diagrams, station installation details, and equipment cabinet details.

D. Quality Assurance Submittals - Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics.

2. Manufacturer's Instructions: Manufacturer's installation instructions.

3. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance. Include troubleshooting guide, wiring terminal identification and equipment parts list.

2. Warranty: Warranty documents specified herein.

F. Project Closeout

1. A one-year maintenance contract offering continued factory authorized service of this system shall be provided as part of this contract. Built drawings that include changes to wiring, wiring designations, junction box labeling and other pertinent information shall be supplied upon completion of the project.

2. The contractor shall furnish manufacturer's manuals of the completed system including individual specifications sheets, schematics, inter-panel and intra-panel wiring diagrams.

   a. All information necessary for the proper maintenance and operation of the system must be included.

   b. Provide four copies.

3. As built drawings that include changes to wiring, wiring designations, junction box labeling, and other pertinent information shall be supplied upon completion of the project.

4. Provide a minimum of two (2) hours of in-service training with the system.

   a. These sessions shall be broken into segments that will facilitate the training of the system users in operating station equipment.

   b. Operating manuals and user's guides shall be provided at the time of training.

1.3 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: Two (2) years commencing on the Date of Substantial Completion.

2. All materials and installation shall be guaranteed to be free of defects in material and workmanship for one year after final acceptance of installation and tests.

1.4 INSTALLATION STANDARDS

A. The system shall be installed in accordance with the 1993 NEC and ADA requirements.

B. The completed system shall be in compliance with state and local electrical codes.

C. All wiring shall test free from grounds and shorts.

1.5 SYSTEM OPERATIONS

A. Furnish, install and place into operation a Rescue Assistance System for this building as indicated on the drawings and as specified herein.

B. A common annunciator shall be provided at the main building entrance where shown on the drawings to indicate light and tone signals from multiple remote call stations.

1. When the call station switch is activated, a red LED button illuminates and a one shot tone sounds.

2. When the alarm signal is acknowledged, the remote call station is signaled with a flashing light and tone.

3. Voice communication with the remote call can then be initiated from the annunciator.

4. Optional access to a public telephone system shall be provided.

PART 2 - PRODUCTS

2.1 RESCUE ASSISTANCE-VISUAL EQUIPMENT

A. Manufacturer: Cornell Communications, Inc.

1. Contact: 7915 N 81st St., Milwaukee, WI 53223-3830;
Telephone: 800- 558-8957; (414) 351-4660; Fax: (414) 351-4657.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Approved equal.

2.3 CORNELL 4200 RESCUE ASSISTANCE-AUDIO/VISUAL SYSTEM AND COMPONENTS

A. Equipment:
This system shall consist of multiple remote call stations, which will share a common annunciator panel and optional access to a public telephone system for external alarm notification.

B. Annunciator

1. The annunciator panel shall be a CORNELL Model A4200 series, with a minimum capacity for (8) zones, surface mounted at the Main Fire Department Entrance to the building.
   a. Verify location with the Local Fire Marshal and the Architect.

2. An alternate action switch with internal LED indicator shall be included for each zone.
   a. A yellow LED light on the zone switch shall illuminate and the alarm shall emit a repeating sound if the supervised wiring is faulted.

3. An audible alarm shall be mounted on the annunciator panel, which will emit a minimum sound level of 90 db at 30 cm when a remote station calls.
   a. Depressing the zone switch will answer a zone and open the intercom line to the zone.

4. The front panel shall have silk-screened zone designations and
operating directions as well as zone designation strips.

5. The power supply shall be a 120 volt emergency battery backup, CORNELL model B-5243A or P-512243A.

6. Provide TAK-4200 telephone access kit which will place a call to a designated location via a dedicated public telephone line to notify them of the alarm.

C. Remote Call Stations

1. The remote call station shall be CORNELL Model 4201A, with one momentary switch with LED and loudspeaker.
2. The station shall have hands free voice communication with the annunciator.
3. The station shall have silk-screened operating instructions.
4. The station shall be flush wall mounted on a 2-gang stainless steel plate with a 48" maximum mounting height for forward reach, and a 54” maximum for side reach.
5. The Vandal Proof Call Station shall be Cornell Model 4201/V. The standard two gang mounting plate cm be flush mounted or wall mounted and incorporate heavy duty switches and speakers along with stainless steel plates and tamper-proof screw. The 4201/V shall contain water resistant switch and speaker for exterior applications.

2.4 SOURCE QUALITY

A. Source Quality: Obtain rescue assistance equipment and system from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.2 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.

3.3 INSTALLATION

A. Cabling Requirements

1. Wiring from the annunciator to the call station shall be 22-gauge, 2 conductor shielded audio pair + 3 conductor unshielded.
2. Wiring from the annunciator to the power supply shall be 18 gauge, 2 conductors.
3. Verify cable types with the Rescue Assistance System Manufacturer.
4. The optional telephone access kit requires a 120V AC outlet and dedicated external telephone line.

B. Rescue Assistance Signal System - Audio/Visual Installation

1. Complete system shall be installed in strict accordance with manufacturer's recommendations.
2. Wiring shall be installed in raceways throughout the building.
   a. Conduit, if required, shall be 1/2" minimum.

3.4 FIELD QUALITY REQUIREMENTS

A. Site Tests (Post Installation Testing): Checkout final connections to the system shall be made by a factory technician authorized by the manufacturer of the products installed.

1. Factory authorized technicians shall demonstrate operation of the complete system and each major component to the staff.
2. System field wiring diagrams shall be provided to this subcontractor by the system prior to installation.

B. Inspection: Perform a complete functional test of the system upon completion of the installation and instruct the staff in the operation and maintenance of the system.

3.5 CLEANING

A. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 26 0890

ELECTRICAL SYSTEMS COMMISSIONING

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern the work in this section.

1.1 SUMMARY

A. Section includes commissioning process requirements for electrical systems, assemblies, and equipment.

B. Related Sections:
1. Section 01 9100 - General Commissioning Requirements.

1.2 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. Integrated Systems: When referenced this encompasses all control, equipment and systems utilized in support of the facility.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA and as defined in the contract documents.

B. Attend construction phase commissioning meetings.

C. Attend test coordination meetings.

D. Participate in the electrical system maintenance orientation and inspection for assemblies and equipment as directed by the CxA.

E. Provide information requested by the CxA, including manufacturer cut sheets and shop drawings for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

G. Provide detailed startup procedures.

H. Provide startup testing for all normal and emergency power equipment and shall coordinate and execute the electrical tasks for the commissioning checklists for all commissioned equipment.

I. Provide copies of all submittals as required including all changes thereto.

J. Facilitate the coordination of the commissioning and incorporate commissioning activities (the Commissioning Plan) into the Overall Project Schedule (OPS).

K. Ensure that all subcontractors and vendors execute their commissioning responsibilities according to the contract documents.

L. Provide training in the operation and maintenance of installed equipment for owner personnel.

M. Review and accept construction checklists provided by the commissioning authority.

N. Complete startup reports and construction checklists as work is completed and provide to the Commissioning Authority on a weekly basis.

O. Review and accept commissioning process test procedures provided by the Commissioning Authority.

P. Complete commissioning process test procedures (functional testing as detailed in functional testing checklists).

Q. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.

R. Cooperate with the CxA for resolution of issues recorded in the "Issues Log".

1.4 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual electrical systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing and operational sequencing per design documents.

D. Provide a final written report outlining the commissioning process and including commissioning field documentation.

1.5 COMMISSIONING DOCUMENTATION

A. The contractor shall provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for electrical systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. System startup reports.
6. Certificate of readiness certifying that electrical systems, subsystems, equipment, and associated controls are ready for testing.
7. Test and inspection reports and certificates.
8. Corrective action documents.
9. Verification of contractually required static and dynamic testing reports.

1.6 SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started, and that they are operating in the manner required by the Contract Documents.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing and adjustments have been completed and that testing and adjustment reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as required and as directed by the CxA.

3.2 TESTING VERIFICATION

A. Prior to performance of testing, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least (ten) 10 days in advance of testing execution and provide access for the CxA to witness testing procedures.

C. Provide technicians, instrumentation, and tools to verify testing of electrical systems at the direction of the CxA.

1. The CxA will notify the electrical contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.

2. The electrical contractor shall use the same instruments (by model and serial number) that were used when original data were collected.

3. Failure of an item includes operational sequence as determined in the contract documents including safeties, capacity, and operational integrity.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning tests at the direction of the CxA.

B. Scope of electrical system testing can include, but is not limited to, entire electrical power distribution installation from central distribution to branch circuit to individual equipment served. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of interface to the building automation system.

D. The CxA with coordination of a certified testing agency, shall prepare detailed testing plans, procedures, and checklists for electrical systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to the Construction Management Representative. After deficiencies are resolved, reschedule tests.

I. Retesting: The CxA will direct the retesting of the equipment once at no "charge" to the Owner for their time. The CxA's time and expenses incurred for a second retest, if required due to no fault of the CxA, will be reviewed by the Owner to determine the appropriate means of compensation to the CxA for extension of services. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors and spot-checked by the CxA during functional testing.

3.4 ELECTRICAL SYSTEMS, SUBSYSTEMS AND EQUIPMENT TESTING PROCEDURES

A. Electrical Installation and Verification: Testing requirements are specified in Division 26 Sections. Provide submittals, test data, inspection records to the CxA.

1. Insulation resistance testing, mechanical integrity tests and inspections, ground testing, continuity, transformer-specific tests, emergency power system and manufacturer startup according to contract, agency and authority having jurisdiction requirements as indicated in Division 26. Electrical contractor shall prepare supporting documentation for compliance for copy to the CxA.

B. The following equipment/systems will be commissioned in this project:

1. Lighting Controls.

END OF SECTION

SECTION 26 0900

GUARANTEE

PART 1 - GENERAL

Applicable Provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section.

1.1 GUARANTEE

A. The Contractor shall remove, replace and/or repair at his own expense and at the convenience of the Owner, any defects in workmanship, materials, ratings, capacities and/or characteristics occurring in the work within two (2) years or within such longer period as may be provided in the Drawings and/or Section of the Specifications, which guarantee period shall commence with the final acceptance of the entire Contract in accordance with the guarantee provisions stated in the General Conditions, and the Contractor shall pay for all damage to the system resulting from defects in the work and all expenses necessary to remove, replace, and/or repair any other work which may be damaged in removing, replacing and/or repairing the work.

END OF SECTION

SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMNETS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Protecting existing trees and vegetation to remain.
   2. Removing trees and other vegetation.
   3. Clearing and grubbing.
   4. Topsoil stripping.
   5. Removing above-grade site improvements.
   6. Disconnecting, capping or sealing, and abandoning site utilities in place.
   7. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:
   1. Division 1 Section "Execution Requirements" for surveying utility locations and for recording field measurements.
   2. Division 1 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
   3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
   4. Division 2 Section "Landscape Work" for finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

B. SUBMITTALS

C. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

D. Record drawings according to Division 1 Section “Closeout Procedures."
   1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.5 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

B. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Notify utility locator service for area where Project is located before site clearing.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section 31 2301 - Excavation, Backfill and Compaction.
   1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.

E. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
   2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Owner's Representative.
   1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
   2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

A. Locate, identify, excavate disconnect, and seal or cap off utilities indicated to be removed.
   1. Review existing survey for indicated utilities.
   2. Review with Owner's representative for additional information and verification.
   3. Arrange to shut off indicated utilities with utility companies.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's Representative written permission. Refer to Section 31 2301 - Excavation, Backfill and Compaction

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
   4. Use only hand methods for grubbing within drip line of remaining trees.

3.5 TOPSOIL STRIPPING

A. Remove grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Limit height of topsoil stockpiles to ten feet.
   2. Do not stockpile topsoil within drip line of remaining trees.
   3. Dispose of excess topsoil as specified for waste material disposal.
   4. Stockpile surplus topsoil and allow for respreading deeper topsoil. Stockpile ares on site is limited. If required stockpile off site.

3.6 SITE IMPROVEMENTS

A. Remove existing above and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement in straight line to remain before removing existing pavement. Saw-cut full depth faces vertically.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

EXCAVATION, BACKFILL AND COMPACTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. This section pertains to interior and exterior areas including the exterior walls of the building, including canopies, loading docks, site and other structures.

B. This work includes the following:

1. Preparing subgrade for building slabs, walks, trenches, equipment pads and pavements.
2. Preparing subbase for support of building slabs, walks, trenches and pavements.
3. Excavating and backfilling for building structure, retaining walls and other structures, including fabric and drainage fill.
4. Excavating and backfilling of trenches.
5. Excavating and backfilling for exterior and interior and underground plumbing, mechanical and electrical utilities and buried plumbing, mechanical and electrical appurtenances, including fabric piping and drainage fill.
    a. **All excavation , backfill concrete and disposal, required for locker rooms, toilets rooms and associated spaces located in the basement of the existing building shall be the responsibility of each MPE Contractor, including fabric piping and drainage fill.**
6. Excavating and backfilling. Refer to plumbing, mechanical and electrical sections for excavation and backfill required in conjunction with underground plumbing, mechanical and electrical utilities and buried mechanical and electrical appurtenances.
7. Final grading and placement and preparation for topsoil for lawns and planting are specified in Section 32 9220 Restoration of Turf.

1.3 RELATED REQUIREMENTS

A. Section 01 2100 - Allowances: For rock removal and additional fill allowances.

B. Section 01 7000 - Execution: For site scoping.

C. Section 01 7420 - Site Waste Handling and Disposal.

D. Section 03 3000 - Cast-in-Place Concrete.

E. Section 03 3020 - Concrete Slab on Grade.

F. Section 22 0150 - Sanitary and Storm Drainage Systems.

G. Section 22 0130 - Water Supply System: Fire line

H. Section 22 0190 - New Gas Connections And Associated Work: Gas Main

I. Section 31 1000 - Site Preparation.

J. Section 31 4260 - Excavation Support And Protection

K. Section 31 6329 - Drilled Concrete Piers.

L. Section 32 1216 - Asphalt Paving.

M. Section 31 2513 - Erosion and Sediment Control.

N. Section 31 2300 - Earthwork (Plastic Drainage Chambers Hudson

O. Section 31 4260 - Excavation Support And Protection.

P. Section 32 1313 - Concrete Paving and Curbs.

Q. Section 32 1810 - Control And Inspections of Sediment Controls.

R. Section 32 3113 - Chain Link Fences And Gates

S. Section 32 9210 - Restoration Of Turf Areas

T. Section 33 1117 - Ductile Iron Water Pipe

U. Section 33-1216 - Water Utility Distribution Valves

V. Section 33 3103 - Drainage Pipe (Sanitary)

W. Section 33 3913 - Drainage Structures With Frames And Covers

X. Section 33 3915 - Mechanical Separator

Y. Section 33 4100 - Foundation Drainage System

Z. Section 33 4104 - Corrugated Polyethylene Storm Drainage Pipe.

AA. Section 33 4914 - Plastic Drainage Chambers

AB. Section 33 5113 - Natural Gas Piping.

AC. Refer to Appendix for Geo-Tech Report and Borings.

1.4 QUALITY ASSURANCE

A. Comply with: New York State Department of Transportation (NYSDOT) "Standard Specifications for Construction and Materials."

B. Routine testing of existing soils and compacted material for compliance with these specifications will be performed as part of Special Inspections.

1. Compacted material not meeting density requirements shall be removed or recompacted and retested at Contractor's expense.

1.5 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

1.6 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to Engineer and Architect to perform the following services:

1. Test materials proposed for use by Contractor to verify specified requirements.
   a. Determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, Modified Proctor.
   b. Perform particle size analysis in accordance with ASTM D 422.

B. Submit Testing Agency qualifications demonstrating experience with similar types of projects.

C. The RDP for Geotechnical Engineering shall perform the following:

1. Identify soils requiring undercutting and replacement while observing proof rolling and when subgrade is exposed.
2. Verify foundation bearing strata (sound bedrock) and drilled pier rock socket.
3. Review and accept materials proposed by Contractor for use as compacted fill based on test data and information submitted by preconstruction Testing Agency. Architect shall coordinate review of submittals.
4. Observe and accept filling and compaction procedures.
5. Review and approve preparation of slab-on-grade subgrade and subbase.

D. Geotechnical Engineer shall submit copies of reports to Special Inspector, Engineer, Architect, Construction Manager, and Contractor. Include date of site visit, description of work observed, and summary of observations and recommendations.

1.7 SUBMITTALS

A. Submit to RDP for Geotechnical Engineering:

1. Gradations for proposed fill materials and mix design proposed for flowable fill at least 15 days before start of backfilling. Flowable fill submittal shall include ASTM C 1260 test results.
2. Product data, specifications, and installation instructions for proprietary materials.
3. Material certifications for products specified to conform with NYSDOT references and ASTM references.

1.8 DEFINITIONS

A. Excavation: Removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

B. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation and remedial work directed by Architect shall be at Contractor's expense.
1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to Architect.
2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification unless otherwise directed by Architect.

C. Additional Excavation: If RDP for Geotechnical Engineering determines bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered. Replace excavated material as directed by Geotechnical Engineer.
1. Removal of unsuitable material and replacement as directed will be paid on basis of conditions of contract relative to Allowances listed in Section 01 2100.

D. Subgrade: Undisturbed earth or compacted soil layer immediately below granular subbase, base of structure, or topsoil materials.

E. Structure: Buildings, foundations, slabs, tanks, curbs, fences or other man-made stationary features occurring above or below ground surface.

1.9 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Site Information: Subsurface investigation reports were used for basis of design and are available to Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
1. Additional test borings and other exploratory operations may be performed by Contractor at Contractor's option; however, no change in contract sum will be authorized for additional exploration.

C. **Refer to Section 01 7000 for scoping requirements.**

D. Existing Utilities: Locate existing underground utilities in work area before starting earthwork operations.
1. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.
2. If uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult with utility owner and Architect immediately for directions. Cooperate with Owner and public and private utility companies to keep services and facilities in operation. Repair damaged utilities as required by utility owner.

a. Do not interrupt existing utilities serving facilities occupied by Owner or others during occupied hours except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.
   a) Provide minimum 48-hours' notice to Construction Manager and Architect and receive written notice to proceed before interrupting utilities.

3. Demolish and remove from site existing underground utilities indicated to be removed. Coordinate with utility companies and MEP prime contractors for shutoff of services if lines are active.

E. Use of Explosives: Do not bring explosives onto site or use in work.

F. Protection of Property: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1. Precondition Survey: Contractor shall perform a precondition survey of structures adjacent to planned excavation and foundation installation and submit to Architect for review. Survey shall include description and photographs of adjacent buildings, clearly identifying benchmarks relative to datum level sufficiently distant so as not be affected by project operations. Contractor shall be responsible for making repairs to existing structures to the Architect, Construction Manager or Owner's satisfaction for damage caused by construction activities not in conformance with these specifications.
2. Perform excavation by hand within drip line of large trees to remain. Protect root systems from damage and from drying out to greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.

1.10 PRODUCT HANDLING

A. Store materials to preserve their quality and fitness for work.

1.11 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Construction Manager or Architect.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 MATERIALS

A. General Fill Material: Soil materials free of clay, rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

B. Flowable Fill Material: Cementitious, flowable, excavatable, backfill material having a compressive strength of 50 to 100 pounds per square inch (psi) at 28 days. Provide mix that minimizes shrinkage and is non-expansive.

C. Structural Fill **(referenced as "Select Fill" in geotechnical report)**: Sound and durable, well-graded sand and gravel, free of deleterious materials such as pyritic shale, organics, or contaminants of a chemical, mineral, or biological nature and conforming to New York State Department of Transportation, paragraph 304-2.02, Type 2 or 4 and the following limits of gradation:

Sieve		**Percent Passing**
Sieve Size	**Size opening (mm)**	
3 inch	**76.20**	**100**
No. 40	**0.42**	**10 - 70**
No. 200	**0.74**	**0-11**

A. Subbase Material: Sound and durable sand and gravel, free of organic and other deleterious materials, conforming to New York State Department of Transportation, paragraph 304-2.02, Type 2 or 4.

B. Drainage Fill: ASTM C-33 Blend 57, a blend of NYSDOT No. 1 and No. 2 crushed stone that complies with material specification requirements of Article 703-02 for crushed stone and the following limits of gradation:

Sieve		**Percent Passing**
Sieve Size	**Size opening (mm)**	
1 1/2 inch	**37.5**	**100**
1 inch	**25.0**	**95 - 100**
1/2 inch	**12.5**	**25 - 60**
No. 4	**4.75**	**0 - 10**
No. 8	**2.36**	**0 - 5**

A. Cushion Sand: Comply with requirements of NYSDOT Section 703-06.

B. Bedding: Comply with the requirements of NYSDOT Section 703-02, material requirements, crushed stone 703-0201, size No. 2.

C. Filter Fabric: “Geotex 351” by Propex Geosynthetics; “Mirafi 140N” by Mirafi, Inc.; or accepted equivalent.

2.2 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile):
1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
2. Separation for foundation drains, underdrains, undercuts: Amoco 2002 & 2004, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
3. Separation/Stabilization beneath pavements: GeoTex 801, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine substrates and conditions under which work shall be performed. Do not proceed with work until unsatisfactory conditions are corrected.

B. Maintain drainage and restrict traffic within building area during construction to maintain integrity of subgrade. Failure to observe these precautions will require Contractor to remove disturbed areas and correct at his expense.

C. Cold Weather Protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations will be monitored by the Owner’s Representative and the following procedures will be followed:
   a. Frozen ground will be removed in its entirety from beneath and five feet beyond the area of fill placement.
   b. The fill material placed will consist of Selected Fill and will be free of all frozen chunks that exceed four inches in size. The material transported to the project site will only consist of material excavated from below the frost depth.
   c. At the end of the work day, the area of fill placement will be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Owner’s Representative.

d. Following work day - Remove the insulated blankets and/or strip the area of all frozen material as specified previously.

e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material will be stripped just prior to pouring concrete

3.2 REMOVALS

A. Refer to Section 31 1000 Site Preparation for additional requirements.

B. Clear, grub, and strip site of vegetation, topsoil, and other organic materials.

C. Fill depressions caused by the clearing and grubbing operations in accordance with the

D. requirements for filling and backfilling, unless further excavation is indicated.

E. Remove brick fragments and other construction debris. Plow-strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material can bond with existing surface.

1. When existing ground surface has a density less than that specified for a particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

F. Remove existing topsoil from areas within the Grading Limit Line where excavation or fill is required.

G. Stockpile approved topsoil where directed until required for use. Place, grade, and shape stockpiles for proper drainage.

1. 1. Topsoil will be tested prior to stockpiling. Stockpile only quantities of topsoil approved in writing for re-use.

H. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris. Legally dispose off Owner's property.

3.3 PROOF ROLLING

A. Following stripping and removing miscellaneous fill, grade and compact exposed subgrade. Proof roll subgrade by making five passes across building area in each direction using smooth-drum vibrating roller having static weight of 10 tons minimum.

B. Undercut soft spots that develop during proof rolling and replace with compacted structural fill. Contractor shall be paid for this work on unit cost basis.

C. Do not perform proof rolling during or immediately after periods of inclement weather.

3.4 EXCAVATION

A. Excavation Classifications: The following classifications of excavation will be made when rock is encountered:

1. Earth excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; and earth and other materials encountered not classified as rock or unauthorized excavation.

a. All excavation shall be classified as EARTH.

2. Rock excavation includes removal and disposal of materials and obstructions classified as rock.

a. Material classified as rock: Gneiss, schist, limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cubic yards. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cubic yards.

b. Gneiss, schist, limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.

c. Intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

d. Masonry building foundations, whether indicated or not, shall be classified as earth excavations.

B. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by the Geo-Tech Consultant, and Construction Manager. Such excavation will be paid on basis of allowances listed in Section 01 2100 Allowances.

C. Potential rock payment lines are limited to the following:

1. Two feet outside of concrete work for which forms are required, except footings.
2. One foot outside perimeter of footings.
3. In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than inside diameter of pipe, but not less than 3-foot-minimum trench width.
4. Outside dimensions of concrete work where no forms are required.
5. Under slabs on grade, 6 inches below bottom of concrete slab.

D. Excavate to the indicted elevations.

E. Excavations shall be laid back or sheeted and braced to prevent sloughing in of sides. Maintain sides and slopes of excavations in stable condition until completion of backfill. Incline cut slopes no steeper than permitted by OSHA standards for excavations in soil type(s) encountered.

F. Hand trim foundation excavations to remove loose soil or ridges of materials left by equipment.

G. Keep loose material and debris out of excavations.

H. Excavation Support and Protection

1. Refer to Section 31 4216.
   a. Shoring and Bracing: Provide materials for shoring and bracing, including sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

I. All excess earth and rock material shall be removed from the site by the Contractor.

3.5 DEWATERING

A. Refer to Section 31 2513 Erosion Control and Sediment Control.

B. Dewatering activities shall conform to Stormwater Pollution Prevention Plan (SWPPP) implemented by site operator if required as a condition of construction permit.

C. Perform excavation and filling in manner and sequence to provide proper drainage at all times.

D. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.6 STORAGE OF EXCAVATED MATERIALS

A. On-site storage of excavated materials shall conform to Stormwater Pollution Prevention Plan (SWPPP) implemented by site operator if required as condition of construction permit.

B. Stockpile excavated materials acceptable for reuse. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edges of excavations. Do not store within drip lines of trees indicated to remain.

C. Dispose of excess excavated soil material and materials not acceptable for use as general fill off site.

3.7 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Notify Construction Manager and Fuller and D'Angelo P.C. of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

C. Excavate trenches to uniform width sufficiently wide to provide ample working room and minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

D. Do not locate trenches that are deeper than adjacent footings closer horizontally to footing than vertical distance separating bottom of trench and bottom of footing.

E. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

1. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of bedding prior to installing pipe.
2. For pipes or conduit less than 6 inches in nominal size and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with bedding or tamped cushion sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads to ensure continuous bearing of pipe barrel on bearing surface.

3.8 FILLING, BACKFILLING AND COMPACTION

A. Do not place fill material on surfaces that are muddy, frozen, or contain frost or ice.

B. Use Structural Fill to increase grades within building areas, as interior backfill against foundations and in trenches, as exterior backfill against walls and as exterior backfill where pavement or walkways abut building.

C. Contractor may use flowable fill to increase grades and as interior backfill against foundations and in trenches. Allow fill to cure for at least 7 days before setting forms for concrete foundations or placing slab on grade.

D. Use subbase material directly below slabs as shown in drawings.

E. Use general fill material to increase grades outside building area except as otherwise specified.

F. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and are carried below bottom of such footings or pass under wall footings. Place concrete to level of bottom of adjacent footing.

G. Backfill foundation excavations as soon as possible following construction of foundations and foundation walls.

H. Backfill and fill against foundation walls evenly on both sides to prevent displacement of construction. For walls with fill on one side only, do not backfill until concrete has achieved 70 percent of its design strength and walls have been braced.

I. Begin filling in lowest section of area.

J. Place fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

K. Lifts or portions thereof not compacted in accordance with specifications shall be recompacted or removed and replaced to meet compaction requirements.

L. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density in accordance with ASTM D 1557, Modified Proctor.
   1. Under foundations, building slabs, structures and steps: Compact top 12 inches of subgrade and each layer of fill material to 95 percent.
   2. Under pavements: Compact top 12 inches of subgrade and each layer of fill material to 95 percent.
   3. Subbase Material: Compact to 95 percent with moisture content no greater than 2 percent wet of optimum.
   4. Under walkways: Compact top 6 inches of subgrade and each layer of fill material to 95 percent.
   5. Under lawn or unpaved areas: Compact top 6 inches of subgrade and each layer of fill material to 90 percent.
   6. Cushion sand: Compact to 100 percent.
   7. Drainage fill: Density testing is not applicable. Compact each layer to minimize voids.

M. Where a power roller is used for compaction, do not approach nearer than 10 feet from walls of new or existing construction.

N. Moisture Control: Where subgrade or layer of soil material must be moisture- conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
   1. Remove and replace or scarify and air-dry soil material too wet to permit compaction to specified density.
   2. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to satisfactory value.

3.9 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending three feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.10 ROUGH GRADING

A. Interior Grading: Trim unexcavated spaces within the building to levels indicated.

B. Exterior Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of 4 inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.
   1. Landscaped Areas: Provide uniform subgrade surface within 1 inch of required level to receive topsoil thickness specified. Compact fill as specified to within three inches of subgrade surface. Remove objectionable material detrimental to proper compaction or to placing full depth of topsoil. If the top three inches of subgrade has become compacted before placement of topsoil, harrow or otherwise loosen rough graded surface to receive topsoil to a depth of three inches immediately prior to placing topsoil.

3.11 SUBGRADE SURFACE FOR WALKS AND PAVEMENT

A. Shape and grade subgrade surface as follows:

1. Walks: Shape the surface of areas under walks to required line, grade and cross section, with the finish surface not more than 1 inch above or below the required subgrade surface elevation.
2. Pavements: Shape the surface of areas under pavement to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subgrade surface elevation.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Thoroughly compact subgrade surface for walks and pavement by mechanical rolling, tamping, or with vibratory equipment as approved to the density specified.

3.12 FINISH GRADING

A. Uniformly grade rough graded areas within limits of the Grading Limit Line to finish grade elevations indicated.

B. Grade and compact to smooth finished surface within tolerances specified, and to uniform levels or slopes between points where finish elevations are indicated or between such points and existing finished grade.

C. Finish surfaces free from irregular surface changes, and as follows:
1. Grassed Areas: Finish areas to receive topsoil to within one inch above or below the required subgrade surface elevations.

D. Spread topsoil directly upon prepared subgrade surface to a depth measuring FOUR inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod. Place to greater depth when necessary to adjust grades to required elevations.
1. Approved existing topsoil within the Grading Limit Line may be used. Provide additional topsoil from outside sources as required.

E. Finish topsoil surface free of depressions which will trap water, free of stones over 1 inch in any dimension, and free of debris.

3.13 TOLERANCES

A. Excavation for structures shall conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot except to facilitate drainage during construction stage.

B. Surface of subbase under building slabs shall be graded smooth and even, free of voids, and rolled to required elevation. Provide final grades within tolerance of 1/2 inch when tested with 10-foot straightedge.

3.14 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

SECTION 31 2513

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Corrugated Polyethylene Storm Drain Pipe and Fittings: Section 33 4104.

1.2 REFERENCES

A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "NEW YORK STANDARDS and SPECIFICATIONS for EROSION and SEDIMENT CONTROL" by NYS Department of Environmental Conservation DOW (i.e., Bluebook). Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical) included in the Storm Water Pollution and Prevention Plan (SWPPP).

B. Storm Water Management: Conform to the latest edition of "NEW YORK STATE STORMWATER MANAGEMENT DESIGN MANUAL" prepared by Center for Watershed Protection for NYS Department of Environmental Conservation.

1.3 RESPONSIBILITY

A. Install and maintain the temporary storm water and diversion control items as shown on the drawings before starting any grading or excavation. Provide any temporary sediment and erosion control measures that may be required within limits of the work, including any staging areas, throughout construction in conformance with the plan, and as directed by the Owner's Representative. Place the permanent control practices required before the removal of the temporary storm water diversion and control items.

B. During construction conduct operations in such a manner as to prevent or reduce to a minimum any damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.

C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

1.4 DESCRIPTION

A. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the contract documents or as ordered by the Owner's Representative during the life of the contract to provide erosion and sediment control.

B. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion. These are used during construction to prevent offsite sedimentation. Temporary structural measures shall include check dams, construction road stabilization, stabilized construction entrance, dust control, earth dike,

level spreader, perimeter dike/swale, pipe slope drain, portable sediment tank, rock dam, sediment basin, sediment traps, silt fence, storm drain inlet protection, straw/hay bale dike, access waterway crossing, storm drain diversion, temporary swale, turbidity curtain, water bars or other erosion control devices or methods as required.

C. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include debris basins, diversion, grade stabilization structure, land grading, lined waterway (rock), paved channel, paved flume, retaining wall, riprap, rock outlets, and stream bank protection or other erosion control devices or methods as required.

D. Vegetative measures shall include brush matting, dune stabilization, grassed waterway, vegetating waterway, mulching, protecting vegetation, seeding, sod, straw/hay bale dike, stream bank protection, temporary swale, topsoil, and vegetating waterways.

E. Weekly inspections will be completed by the Owner's Representative. Comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and the site is properly stabilized, a minimum of monthly inspections must be maintained. The stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Weekly inspections must resume no later than March 15.

1.5 DEFINITIONS – TEMPORARY STRUCTURAL MEASURES

A. Construction Road Stabilization: Stabilization of construction roads to control erosion.

B. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile where traffic enters a construction site to reduce or eliminate tracking of sediment to public roads.

C. Dust Control: Prevent surface and air movement of dust from disturbed soil surfaces.

D. Silt Fence: A barrier of geo-textile fabric installed on contours across the slope to intercept runoff by reducing velocity. Replace after 1 year.

E. Storm Drain Inlet Protection: A semi-permeable barrier installed around storm inlets to prevent sediment from entering a storm drainage system.

1.6 DEFINITIONS – PERMANENT STRUCTURAL MEASURES

A. Retaining Wall: A structural wall constructed to prevent soil movement down steep slopes.

B. Riprap: A layer of stone designed to protect slopes that are subject to erosion.

1.7 DEFINITIONS – VEGETATIVE MATERIALS MEASURES

A. Protecting Vegetation: Protecting trees, shrubs, ground cover and other vegetation from damage.

B. Temporary Seeding: Erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

C. Permanent Seeding: Grasses established and combined with shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.

D. Sod: Used where a quick vegetative cover is required.

E. Topsoil: Placed before permanent seeding or sod is installed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Seeding: Permanent see Section 329219.

2.2 COMPANIES-TEMPORARY STRUCTURAL

A. Mirafi, 365 South Holland Drive, Pendergrass, Ga, 30567, (888) 795-0808, www.mirafi.com.

B. North American Green, 14649 Highway 41 North, Evansville, IN 47725, (800) 772-2040, www.nagreen.com.

C. Siltdam Inc., P.O. Box 960, Brockton MA, 02303, (800) 699-2374, www.spilldam.com.

D. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.

E. Belton Industries, 5600 Oakbrook Parkway, Norcross GA., 30093, (800) 225-4099, www.beltonindustries.com.

F. KriStar, 1219 Briggs Ave., Santa Rosa, CA 95401, (800) 579-8819, www.kristar.com.

G. Rolanka International Inc., 155 Andrew Drive, Stockbridge GA 30281, (800) 760-3215, www.rolanka.com.

H. Apex Resources Inc., 12910 Shelbyville Road, Louisville, KY 40243 (888) 677-2739, www.apexr.com.

I. MonoSol, LLC, 707 E. 80th PL., Merrillville, IN 46410 (800) 237-9552, www.terraloc.com.

J. Brockton Equipment Inc., P.O. Box 960, Brockton, MA 02303 (800) 699-2374, www.spilldam.com.

K. Aer-Flo Inc., 4455 18th St. East, Bradenton, FL 34203 (800) 823-7356, www.aerflo.com.

L. Contech Construction Products Inc., 9025 Centre Point Drive, Suite 400, West Chester, Ohio 45069, (800) 338-1122, www.contech-cpi.com.

2.3 COMPANIES-VEGETATIVE

A. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.

B. Agrecol Corporation, 2918 Agriculture Drive, Madison, Wi, 53718, (608) 226-2544, www.agrecol.com.

PART 3 EXECUTION

3.1 WORK AREAS

A. The Owner's Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Owner's Representative may increase or decrease this area of erodible earth material exposed at one time as determined by his analysis of project, weather and other conditions. The Owner's Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.

B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.

C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall apply rye grass at a rate of 1 lb/ 1000 sq.ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5 lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/ 1000 sq. ft. or wood fiber hydromulch at the manufacturer's recommended rate. Hay or straw shall be anchored.

D. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.

E. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.

F. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Related Sections include the following:
   1. Section 01 5000 - Temporary Facilities and Controls for temporary utilities and support facilities.
   2. Section 31 2316 - Excavation. for excavating and backfilling and for existing utilities.

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
   1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
   2. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.
   1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For Installer and professional engineer.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Construction Manager and then only after arranging to provide temporary utility services according to requirements indicated.

B. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
   1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Construction Manager if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches (75 mm).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
   1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
   1. Do not close or obstruct walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

D. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier beams before starting excavation. Space soldier beams at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier beams as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at centers indicated and secure to soldier beams.

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Limit vertical offset of adjacent sheet piling to 60 inches (1500 mm). Accurately align exposed faces of sheet piling to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 UNDERPINNING

A. Excavate as required for placing underpinning in alternate sections not exceeding 2'-0" in width and to depths required to install the concrete Work as shown. If not otherwise shown carry the underpinning down to the level of the footings of the new construction. Alternate sections of concrete underpinning shall be in place supporting the superimposed loads properly before adjacent sections of earth are excavated.

B. Provide approved shoring as required to prevent damage to existing Work until the under pinning is complete and in condition to support the structure.

C. Install forms for exposed faces and at each end of each section of the concrete underpinning. No forms will be required for underpinning in contact with existing Work.

D. Roughen and clean existing concrete surfaces that will be in contact with concrete underpinning. Wet such surfaces and then coat with neat cement grout. Place new concrete before the grout has attained its initial set.

E. Install concrete underpinning in alternate sections not exceeding 4'-0" in width and up to approximately 3 inches below the bottom of the existing foundations to be supported. Provide a 2 x 4 inch key type construction joint for full height of the concrete at each end of each section. After the underpinning has set for 24 hours, pack the void between the top of the underpinning and the existing Work full with stiff concrete solidly rammed in place.

F. Provide wedges, plates and beams to transfer the load of the structure to the underpinning if required to prevent settlement.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
   1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Architect.
   2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
   3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
   1. Repair or replace, as approved by Architect or Construction Manager, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

END OF SECTION

DRILLED CONCRETE PIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this Section.

B. Section 31 2301: Structural Excavation, Backfill, and Compaction (Building Area).

C. Section 03 3000: Cast-In-Place Concrete.

1.2 DESCRIPTION OF WORK

A. This section includes installation of deep foundation units consisting of reinforced concrete straight shaft piers bearing on underlying bedrock. The following items are specifically included without limiting the generality implied by these specifications:

1. Excavation, dewatering, and removal of excavated material.
2. Steel liners or casings.
3. Reinforced concrete.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. ACI 318 "Building Code Requirements for Structural Concrete."
2. ACI 336 "Design and Construction of Drilled Piers."
3. FHWA "Drilled Shafts: Construction Procedures and Design Methods."

B. Work shall conform to generally accepted engineering and construction practices for construction of drilled concrete piers.

C. Installation shall be performed by Contractor with minimum 5 years experience in work of this type and scope. As a minimum, Contractor shall submit satisfactory evidence of successful completion of at least three drilled concrete pier installation projects comparable in scope to this project. Contractor's qualifications shall include use of suitable equipment and competent personnel for work of this type and scope. Provide the following:

1. Written statement verifying experience in this type of installation and the competence and experience of person in charge at site.
2. Written statement naming at least three comparable installations within the past 5 years, identifying design consultant and Owner's names.
3. Written description of equipment and methods used.
4. Written description of difficulties encountered and how they were overcome.

1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and the Schedule of Special Inspections.

1.5 MATERIAL EVALUATION/QUALITY CONTROL

A. Preconstruction Testing: Contractor shall employ a Testing Agency acceptable to Engineer and Architect to perform material evaluation tests and to evaluate concrete mixes prior to submittals.

B. Testing Agency Qualifications: Independent Testing Agency shall demonstrate to Architect's satisfaction that it has experience and capability to satisfactorily perform the testing indicated without delaying progress of work.

C. Provide pier location plan showing location and designation of each pier.

D. The Registered Design Professionals (RDPs) for Geotechnical and Structural Engineering will visit construction site at appropriate intervals to determine if work is in general conformance with Contract

Documents and specifications. Notify RDPs 48 hours before anticipated time of completion of work for a given section of work so that they may determine if site observations are required. If site observations are required, do not place concrete until RDPs have had an opportunity to observe reinforcement and subgrade conditions.

1.6 SUBMITTALS

A. At least 14 days before proposed start of work, Contractor shall submit the following for review and acceptance:

1. Description of proposed drilling equipment and installation procedure.
2. Description and details of proposed pier construction and casing.
3. Mix designs for concrete.
4. Reinforcing details.

B. Submittal shall include the following information:

1. Shop drawing for pile layout and reinforcing.
2. Size, wall thickness, type, and length of casing or liners.
3. Drawings and details describing proposed sequence of drilled shaft installation.
4. Information describing type of equipment to be used, including drill rig, augers, drilling tools, final cleaning equipment, desanding equipment, slurry pumps, sampling equipment, tremies or concrete pumps, centralizers, casings including casing dimensions, material, and splice details, etc.
5. Details and method of concrete placement, curing, and protection.
6. Method of reinforcement placement, including support and centralization type and methods.
7. Proposed method for cleaning out shaft excavations. Include description of how spoils will be removed and disposed off-site.
8. Method describing how work will progress through obstructions and rock.
9. Procedure for filling voids between permanent casing and soil.
10. If slurry is to be used, indicate method proposed to mix, circulate, desand, remove, and dispose of slurry.
11. An emergency construction joint procedure to be used in event concrete placement for drilled shaft is unexpectedly interrupted.

1.7 PROJECT CONDITIONS

A. Site Subsurface Information: A geotechnical evaluation prepared was used for the basis of design and is available for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Owner makes this boring data available for information only and does not guarantee its accuracy or consistency. It is Contractor's responsibility to make interpretations and draw conclusions on character of materials encountered and impact on work based on his knowledge of pier installation techniques.

B. Contractor shall examine site and apprise himself of conditions affecting his work.

C. Contractor shall assume responsibility of existing surface and subsurface conditions insofar as they affect the work and shall make no claim against Owner based on misunderstanding or misinterpretation of existing conditions.

D. If uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult Architect immediately for directions as to procedure.

E. Cooperate with Owner and public or private utility companies to keep their services and facilities in operation.

F. Repair damaged utilities to satisfaction of utility company.

G. Do not bring explosives onto site or use in work.

H. See Temporary Facilities for water.

1.8 DRILLED PIER REQUIREMENTS

A. Drilled pier dimensions shown are minimums.

B. Allowable end bearing and skin friction values are indicated in drawings.

C. Provide casings as required.

D. Reinforce drilled piers as indicated in drawings.

1.9 PRODUCT HANDLING

A. Store materials so as to preserve their quality and fitness for work. Store reinforcement and casings in manner to prevent damage and accumulation of dirt.

1.10 WORKMANSHIP

A. Contractor shall be responsible for correction of concrete work not conforming to specified requirements, including strength, tolerances, and finishes. Correct deficient concrete as directed by Engineer.

B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete: Reinforced concrete materials and construction shall conform to Specification Section 03 3000, Cast-In-Place Concrete.

B. Casing: Full-length, watertight casing shall be welded steel pipe (line pipe) of sufficient thickness and strength to withstand compressive displacement and withdrawal stresses and to maintain shaft walls.

C. Reinforcing Steel: ASTM A 615, Grade 60; free of rust, grease, oil, or other materials that may corrode steel or destroy bond with concrete.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Examine conditions under which drilled concrete piers shall be placed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION PROCEDURE

A. Drilled concrete piers shall be installed using rotary or rotary/percussion drilling equipment to advance casing of suitable size and strength.

B. Install casing and drill to sound bedrock. Excavation shall include removal of soil and weathered rock as required to advance casing to sound bedrock as determined by Special Inspector and accepted by Geotechnical Engineer. Continue drilling into bedrock to provide socket length indicated in drawings. Rock bearing surface shall be level and free of loose rock or soil.

C. After casing has been installed, remove drill cuttings and other deleterious material. Clean bottom of pier free of soil accumulation.

D. Before concrete placement is allowed, casing and bedrock bearing shall be inspected and determined to be acceptable by Special Inspector. Contractor shall provide means for safe access for inspection. Perform concreting immediately after inspection and acceptance. If concreting is delayed, bearing surface must be reinspected before concreting begins.

E. Install steel reinforcing prior to final placement of concrete.

F. Provide and maintain pumping equipment to keep excavations free of water before placing concrete. As an alternative, allow water level to attain its normal level after inspection and place concrete by tremie. Control placement operations to ensure tremie is not broken during continuous placing from bottom to top.

G. If excavation is dewatered, use hopper to direct concrete into center of excavation.

H. Place concrete continuously without interruption and in a smooth flow without segregating mixed

materials.

I. Provide mechanical vibration for consolidation of upper 10 feet of drilled pier.

J. Interrupted placing operations of over one-hour duration shall require cold-joint installation.

K. At cold joints, leave resulting shaft surface approximately level and provide ACI Class B splice of reinforcing shown in drawings, or provide mechanical splice to develop 125 percent of yield strength of bar.

L. At resumption of concrete placing, clean off surface laitance, roughen as required, and slush with 1-to-1 cement grout before placing remainder of concrete.

M. Do not allow deleterious materials to fall into concrete. Bring concrete to at proper elevations and strike off. Install steel reinforcing bars with proper projection to receive subsequent work.

N. Temporary or permanent casing may be used. Temporary casing may be removed as concrete is being placed. Pulling of casing must be made without contamination of concrete or other effects detrimental to pier. Contractor shall maintain sufficient head of concrete greater than outside water head. At a location starting not less than one foot below finished grade, use removable forms to form pier from this elevation to top of pier elevation.

3.3 TOLERANCES

A. Install piers within 2 inches of plan position.

B. Variation from plumb shall not exceed 1.0 percent.

C. If tolerances are exceeded, Contractor may, at no additional expense to Owner, enlarge size of an out-of-position or out-of-plumb hole and provide acceptable additional reinforcing and reinforcing splices so above-grade portion of pier can be constructed in true position and plumb. Design deviations shall provide installation equivalent to basic design without incurring additional cost to Owner. Submit design deviations to Engineer for review.

3.4 CLEAN-UP

A. Remove from premises excavated material and other rubbish or debris resulting from drilled pier installation.

END OF SECTION 31 6329

ASPHALT PAVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Aggregate base course.

B. Road Paving: Double course bituminous concrete paving.

C. Heavy Duty Road Paving: Double course bituminous concrete paving.

D. Walkway Paving: Single course bituminous concrete paving.

E. Asphalt Repairs.

F. Hot mix asphalt overlay.

G. Hot-mix asphalt patching.

H. Surface sealer.

1.3 RELATED REQUIREMENTS

A. Section 32 1313 - Concrete Paving and Curbs.

B. Section 32 1723.13 - Painted Pavement Markings.

1.4 REFERENCE STANDARDS

A. New York State Department of Transportation

B. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 2015.

C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt
1. Pavements," unless more stringent requirements are indicated.

D. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

C. Job-Mix Designs: For each job mix proposed for the Work.

D. Indicate, with international graphics symbol, spaces dedicated to people with disabilities

E. Shop Drawings: Pavement markings, lane separations, and defined parking spaces.

F. Samples: For each paving fabric, 12 by 12 inches minimum.

G. Qualification Data: For manufacturer.

H. Material Test Reports: For each paving material.

I. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be a paving-mix manufacturer registered with and approved by the New York DOT.

B. Perform Work in accordance with State of New York Highways standard.

C. Mixing Plant: Conform to State of New York Highways standard.

D. Obtain materials from same source throughout.

1.7 REGULATORY REQUIREMENTS

A. Regulatory Requirements: Comply with SHA for asphalt paving work.

B. Conform to New York State and NY DOT code for paving work on public property.

1.8 FIELD CONDITIONS

A. Prime and Tack Coats: Minimum surface temperature of 60 deg F

B. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

C. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

D. Place bitumen mixture when temperature is not more than 15 F degrees (8 C degrees) below bitumen supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Asphalt concrete and all related items shall meet the requirements of NYSDOT Section 400

B. Aggregate for Base Course shall be Type 4 and conform to the requirements of Section 304 of the NY State DOT Specifications.

1. Gradation shall conform to the following:

	Sieve Size Designation	Percent Passing by Weight
a.		
b.	3 inch	100%
c.	2 inch	90-100%
d.	1/4 inch	30-65%
e.	No. 40	5-40%
f.	No. 200	0-1%

C. Binder Course: Type 3, NYSDOT Sections 401, 403

D. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

E. Water: Potable.

F. Surface Course: Type 7F, NYSDOT Sections 401, 403

G. Primer: In accordance with State of New York Highways standards.

H. Tack Coat: In accordance with State of New York Highways standards 702-90.

I. Seal Coat: AI MS-19, slurry type.

2.2 ASPHALT PAVING MIXES AND MIX DESIGN

A. Refer to NYDOT Specification.

B. Submit proposed mix design of each class of mix for review prior to beginning of work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

D. Review condition of subgrade and preparatory work.

E. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

3.2 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct lay-down and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

D. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

E. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

F. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

G. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

H. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

I. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

J. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.3 BASE COURSE

A. Proof roll subbase surface with a ten (10) ton static steel wheel roller to check for unstable or otherwise unsuitable areas, as determined by the Architect. Replace and recompact all unsatisfactory areas, as approved by the Architect, prior to commencement of paving operations.

B. Construction of crushed stone base shall be in accordance with the applicable requirements of Section 304 of the New York State Specifications and as required herein.

3.4 PREPARATION - PRIMER

A. Apply primer in accordance with State of New York Highways standards.

B. Use clean sand to blot excess primer.

3.5 PREPARATION - TACK COAT

A. Apply tack coat in accordance with State of New York Highways standards.

B. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.6 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Asphalt concrete shall not be applied on a wet surface or when the air temperature is below 45 degrees F. unless otherwise directed, or when weather conditions would prevent proper construction

B. Install Work in accordance with State of New York Highways standards 400 unless otherwise specified..

C. Place asphalt within 24 hours of applying primer or tack coat.

D. Place to thickness identified in schedule at end of Section.

E. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.7 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place binder course to thickness identified in schedule at end of section.

C. Place wearing course within two hours of placing and compacting binder course.

D. Place wearing course to thickness identified in schedule at end of section.

E. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
   1. Clean contact surfaces and apply tack coat to joints.
   2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
   3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
   4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
   5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
   6. Compact asphalt at joints to a density within 2 percent of specified course density

3.9 PATCHING AND REPAIRS

A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
   1. Tack coat faces of excavation and allow to cure before paving.
   2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
   3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

B. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
   1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

C. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch (6 mm). Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.

D. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or Portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. of surface.
   1. Allow tack coat to cure undisturbed before paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.10 CURBS Refer to Section 32 1313

3.11 PAVEMENT MARKING Refer to Section 32 1723

3.12 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.

B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements

3.13 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.

B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.14 DISPOSAL

A. Except for material indicated to be recycled, if any, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

B. Do not allow excavated materials to accumulate on-site

3.15 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for three (3) days or until surface temperature is less than 140 degrees F (60 degrees C).

3.16 SCHEDULE

A. Standard at Road Paving: Double course of: 6" base course; 3" binder course and 2" surface course: 11" inch (_____ mm) compacted thickness, and seal coat.

B. Heavy Duty Road Paving: Double course of: 8" base course; 4" binder course and 2" surface course: 12" inch (_____ mm) compacted thickness, and seal coat.

C. Walkway Paving: Single course of: 4" base course and 2" surface course: 6" inch (150 mm) compacted thickness, and seal coat.

END OF SECTION

CONCRETE PAVEMENT AND CURBS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete for the following:
   1. Concrete sidewalks, integral curbs, curbs, and ramps.
   2. Ramps

B. Related Sections include the following:
   1. Section 03 3000 Cast-in-Place Concrete for general concrete requirements for site and building applications of concrete.
   2. Section 03 3020 Concete Slab on Grade for general concrete requirements for building slab applications of concrete.
   3. Section 05 5100 - Metal Stairs for railings and mesh.
   4. Section 31 2301 - Excavation, Backfill and Compaction for subgrade preparation, grading, and subbase course.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Refer to Section Section 03 3000 Cast-in-Place Concrete.

C. Product Data: For each type of manufactured material and product indicated.

1.5 QUALITY ASSURANCE

A. Refer to Section Section 03 3000 Cast-in-Place Concrete. Including the following:

B. Installer Qualifications: An experienced installer, with a minimum of five (5) years experience, who has completed pavement work 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.

1.6 MATERIAL EVALUATION/QUALITY CONTROL

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

1.7 PRE-INSTALLATION CONFERENCE

A. Attendance: Contractor, installer, and Construction Manager and those requested to attend.

B. Meeting Time: Minimum of 3 weeks prior to the beginning of the work of this Section and work of related Sections affecting the work of this Section.

C. Location: Project site.

D. Review procedures for conducting work of this Section, including:
   1. Review of mix design and mix test results.
   2. Mixing procedure.
   3. Conditions for acceptance of concrete at project site.
   4. Placement procedures.
   5. Finishing options and procedures.
   6. Curing and crack control procedures.

7. Testing for acceptable moisture emissions, alkalinity pH levels, and relative humidity of concrete slab prior to installation of finish flooring.

1.8 MOCK-UP

A. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

B. Build mockups in the location and of the size as directed by Construction Manager.

C. Notify Construction Manager seven days in advance of dates and times when mockups will be constructed.

D. Obtain Construction Manager's approval of mockups before starting construction.

E. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.

F. Demolish and remove approved mockups from the site when directed by Construction Manager.

G. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

1.11 WORKMANSHIP

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

PART 2 PRODUCTS

2.1 FORMS

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

2.2 STEEL REINFORCEMENT AND FIBERS FOR CONCRETE REINFORCEMENT

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

2.3 CONCRETE MATERIALS

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

B. Compressive Strength:.4000 PSI . minimum.

2.4 ADMIXTURES

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

2.5 RELATED MATERIALS

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

2.6 PROPORTIONING AND MIX DESIGN

A. Refer to Section Section 03 3000 Cast-in-Place Concrete for applicable requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction.

B. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

C. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement. Provide edge forms for all area where brick pavers or installed in concrete pavements.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping.

3.4 POURED-IN-PLACE CONCRETE CURBS

A. Concrete curbs shall be as shown on drawings. Where curbs abut walkways the curbs shall be integral with the sidewalk.

B. Poured-in-place concrete curbs shall conform to NYSDOT Specifications Section 609, “Curbing, Gutters and Concrete Mall” and appropriate materials section(s) 700 series, except as otherwise noted.

C. Reinforcing: Minimum two #5 rods top and bottom of all curbs.

D. Concrete shall be compacted with an approved immersion type mechanical vibrator. Forms shall be left in place 24 hours or until the concrete has sufficiently hardened so that they can be removed without injury to the curb. Upon removal of the forms, the exposed faces of the curb shall be immediately rubbed to a uniform surface. Rubbing shall be accomplished by competent finishers. No plastering will be permitted.

E. Protect concrete surface from loss of surface moisture for at least 6 days by covering with kraft paper. Lap paper, mats 4 inches at edges and ends; seal kraft paper. Burlap is not permitted.

F. All expansion joints for concrete curbs shall be 1/2 inch premolded nonextruding filler as specified in Part 2 herein. Expansion material shall be one (1) piece to conform to the cross section of the curb.

G. Curbs shall be cast with expansion joints. Expansion joints shall line up with joints in walk, maximum 15 feet O.C.

H. The contractor shall keep the concrete curbs clean, aligned and protected from damage until final acceptance of the work. Blow out control joints prior to acceptance. Any curb damaged prior to the final acceptance of the work shall be repaired or replaced at the contractor's expense.

I. Concrete curbs concrete shall be compacted with an approved immersion type mechanical vibrator. The vibrator shall be of the size and weight capable of thoroughly vibrating the entire mass of concrete without damaging or misaligning the forms. Forms shall be left in place 24 hours or until the concrete has sufficiently hardened so that they can be removed without injury to the curb. Upon removal of the forms, the exposed faces of the curb shall be immediately rubbed to a uniform surface. Rubbing shall be accomplished by competent finishers. No plastering will be permitted.

J. Immediately after placing or finishing, protect concrete surface from loss of surface moisture for at least six (6) days by any of the following: continuous spraying membrane-compound curing, covering with kraft paper, mats or burlap; lap paper, mats or burlap 4 inches at edges and ends; seal kraft paper. Use burlap only for unexposed surfaces and use two (2) layers.

K. All expansion joints for concrete curbs shall be 1/2 inch premolded nonextruding filler as specified in Part 2 herein. Expansion material shall be one (1) piece to conform to the cross section of the curb.

L. Curbs shall be cast with expansion joints. Expansion joints shall line up with joints in walk, maximum 16 feet O.C.

M. Between expansion joints at midpoint between expansion joints and opposite a proposed dumming joint in walks, a control joint shall be created during forming and placing. Control joint shall be made by inserting into the forms at right angle to the curb on oiled steel or other rigid plate 1/8 inch wide for full curb section. Plate shall be carefully removed after the curb has set and ragged edges repaired.

N. Around curves of radius below 30 feet use expansion joints at tangent points. Where curve length is 16 feet or over provide intermediate control joint. On small curves of 180 degrees, provide intermediate control joint.

O. The contractor shall keep the concrete curbs clean, aligned and protected from damage until final acceptance of the work. Blow out control joints prior to acceptance. Any curb damaged prior to the final acceptance of the work shall be repaired or replaced at the contractor’s expense.

3.5 CONCRETE FINISHING

A. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius (6 mm radius).

B. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8.

3.6 ACCESSORIES

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following
2. materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
3. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

4. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.7 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Contraction Joint Depth: Plus 1/4 inch, no minus.
5. Joint Width: Plus 1/8 inch, no minus.

3.8 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Owner's Representative.

B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.9 QUALITY CONTROL

A. Testing Agency: The contractor shall engage a qualified independent testing and inspection agency to sample materials, perform deign mixes and submit test reports to the Owner's Representative

B. The Owner shall engage a qualified independent testing and inspection agency during concrete placement according to requirements specified in this Article.

C. Testing Services: Testing shall be performed according to the following requirements:
1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less
4. than one test for each day's pour of each type of air-entrained concrete.
5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
6. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
7. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
8. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class,

location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Owner's Representative. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Owner's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.11 CONCRETE MIX DESIGN SUBMITTAL FORM

A. As specified in Section 03 3000.

END OF SECTION

TRAFFIC SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Furnish and install sign face-sheet aluminum signs of type specified, metal sign posts, at locations indicated on the plans or as ordered and in conformance with the plans and these specifications.

1.3 RELATED REQUIREMENTS

A. Section 01 2100 - Allowances

B. Section 01 3000 - Administrative Requirements: Submittals procedures.

C. Section 01 5000 - Temporary Facilities and Controls.

D. Section 01 3553 - Site Safety and Security Procedures

E. Section 01 7000 - Execution.

F. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

G. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties.

H. Section 31 2301 - Excavation, Backfill and Compaction.

I. Section 32 1810 Erosion Control And Inspections of Sediment Controls.

J. Reference Drawing Site Safety and Logistics Plan for temporary parking, signage, gravel, fencing and protection.

1.4 REFERENCE STANDARDS

A. New York State Department of Transportation.

B. The Manual on Uniform Traffic Control Devices (MUTCD).

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.6 MOCK-UP

A. Provide mock-up for evaluation of installation workmanship.

B. Locate mock-up where directed by Fuller and D'Angelo, P.C.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products above ground until ready for installation.

B. Prevent excessive soil and mud from coming in contact with sign and posts.

C. Protect material from damage. Do not use damaged material. Remove damaged material from the site.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metal Signs shall be minimum 16 gauge steel.

B. Reflective sheeting shall conform to the requirements of the State of NY DOT.

C. Silk screening of enclosed lens and encapsulated lens reflective sheeting shall conform to the requirements specified by the reflective sheeting manufacturer.

D. Metal sign posts shall be 1-5/8" x 1-3/4" x 3-1/2".

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

A. Placement and dimensions of copy, border and mounting holes to conform to details as shown on drawings. Accomplish the silk screening of all copy, border and background on encapsulated lens reflective sheeting before the application of the reflective sheeting to the finished aluminum sign blank. Use heat activated adhesive type encapsulated lens reflective sheeting and apply in a manner specified by the reflective sheeting manufacture

B. Apply reflective sheeting in such a manner that the finished sign will be wrinkle and bubble free. No splices of the reflective sheeting will be permitted on any sign face under 30 square feet in area with one dimension of 4' or less and no more than one splice will be permitted on any one sign without the approval of the Engineer.

C. Directly apply cutout enclosed lens and encapsulated lens reflective sheeting copy and border in conformance with the requirements specified by the reflective sheeting manufacturer. Apply cutout copy and border directly to clean, dust free reflective sheeting background panels. Cut borders neatly and butt-join at corners and panel joints. Use enclosed lens reflective sheeting of uniform brightness color for direct applied cutout copy and border.

D. After complete fabrication of the sign as indicated on the plans and in conformance with the requirements contained in the specifications, mount the sign on the type of support designated on the plans after satisfactorily installing the support at its proper location. Install the reinforcing plate as shown on the plans.

E. Install posts as indicated on drawing.

END OF SECTION

PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Parking lot markings, including parking bays, arrows, handicapped symbols, curb markings, space numbers, and _____.

B. Roadway lane markings and crosswalk markings.

C. "No Parking" curb painting.

1.3 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls.

B. Section 01 7000 - Execution.

C. Section 32 1216 - Asphalt Paving.

D. Section 32 1313 - Concrete Paving and Curbs.

E. Section 32 1726 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

F. Reference Drawing - Site Safety Plan.

1.4 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; 2007d (Validated 2017).

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons (18 L) accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; white.

1. Parking Lots: Yellow.
2. Handicapped Symbols: Blue.

B. Paint For Obliterating Existing Markings: FS TT-P-1952; black for bituminous pavements, gray for portland cement pavements.

C. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

D. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Fuller and D'Angelo P.C. of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Obliteration of existing markings using paint is acceptable in lieu of removal; apply the black paint in as many coats as necessary to completely obliterate the existing markings.

D. Clean surfaces thoroughly prior to installation.

1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

G. Temporary Pavement Markings: When required or directed by Fuller and D'Angelo P.C., apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.

1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Port Chester-Rye UFSD.

3.3 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F (10 degrees C) or more than 95 degrees F (35 degrees C).

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch (0.4 mm), minimum.
   3. Length Tolerance: Plus or minus 3 inches (75 mm).
   4. Width Tolerance: Plus or minus 1/8 inch (3 mm).

G. Roadway Traffic Lanes: Use suitable mobile mechanical equipment that provides constant agitation of paint and travels at controlled speeds.
   1. Conduct operations in such a manner that necessary traffic can move without hindrance.
   2. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.
   3. If paint does not dry within expected time, discontinue paint operations until cause of slow drying is determined and corrected.
   4. Skip Markings: Synchronize one or more paint "guns" to automatically begin and cut off paint flow; make length of intervals as indicated.
   5. Use hand application by pneumatic spray for application of paint in areas where a mobile paint applicator cannot be used.
   6. Distribute glass beads uniformly on the paint lines within ten seconds without any waste, applied at rate of 6 pounds per gallon (720 g per L) of paint; if the marking equipment does not have a glass bead dispenser, use a separate piece of equipment adjusted and synchronized with the paint applicator; remove and replace markings having faulty distribution of beads.

H. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

I. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.4 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Port Chester-Rye UFSD.

END OF SECTION

TACTILE WARNING SURFACING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

1.3 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

B. Section 32 1313 - Concrete Paving and Curbs: Concrete sidewalks and ramps.

C. Section 32 1726 - Tactile Warning Surfacing: Crosswalk and curb markings.

1.4 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.

C. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2011.

D. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.

E. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

F. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

G. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2015.

H. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.

I. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

J. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.

C. Samples: For each product specified provide two samples, 8 inches (203 mm) square, minimum; show actual product, color, and patterns.

D. Shop Drawings: Submit plan and detail drawings. Indicate:
   1. Locations on project site. Demonstrate compliance with referenced accessibility standards.
   2. Sizes and layout.
   3. Pattern spacing and orientation.
   4. Attachment and fastener details, if applicable

E. Warranty: Submit manufacturer warranty; complete forms in Port Chester-Rye UFSD's name and register with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience in the manufacturing of Cast In Place Detectable/Tactile Warning Surface Tiles.

B. Installer Qualifications: Company certified in writing by product manufacturer as having successfully completed work substantially similar to the work of this section.

C. Vitrified Polymer Composite (VPC) Cast In Place Detectable/Tactile Warning Surface Tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2" height, 0.9" base diameter, and 0.45" top diameter, spaced center-to-center 2.35" as measured "In Line". For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045" high, per square inch; "Armor-Tile" as manufactured by Engineered Plastics Inc., Tel: 800-682-2525, or approved equal.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.

B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F (4 and 32 degrees C).

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 TACTILE AND DETECTABLE WARNING DEVICES

A. Vitrified Polymer Composite (VPC) Cast In Place Detectable/Tactile Warning Surface Tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2" height, 0.9" base diameter, and 0.45" top diameter, spaced center-to-center 2.35" as measured "In Line". For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045" high, per square inch.

B. Dimensions: Cast In Place Detectable/Tactile Warning Surface Tiles shall be held within the following dimensions and tolerances:

1. Water Absorption: 0.05 percent, maximum, when tested in accordance with ASTM D570.
2. Slip Resistance: 0.50 minimum dry static coefficient of friction, when tested in accordance with ASTM D2047.
3. Compressive Strength: 28,000 pounds per square inch (- MPa), minimum, when tested in accordance with ASTM D695-02a.
4. Tensile Strength: 19,000 pounds per square inch (- MPa), minimum, when tested in accordance with ASTM D638-03.
5. Flexural Strength: 25,000 pounds per square inch (172 MPa) minimum, when tested in accordance with ASTM D790-03.
6. Chemical Stain Resistance: No reaction to and without discoloration or staining - 10% hydrochloric acid, urine, saturated calcium chloride, black stamp pad ink, chewing gum, red aerosol paint, 10% ammonium hydroxide, 1% soap solution, turpentine, Urea 5%, diesel fuel and motor oil, when tested in accordance with ASTM D543-95.
7. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM D 2486-00 with reciprocating linear motion of 37± cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallic sand paper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block is to be 3.2 lb. Average wear depth shall not exceed 0.060 after 1000 abrasion cycles when measured on the top surface of the dome representing the average of three measurement locations per sample.
8. Resistance to Wear of Unglazed Ceramic Tile by Taber Abrasion per ASTM C501-84 (re approved 2002) shall not be less than 500.
9. Gardner Impact to Geometry "GE" of the standard when tested by ASTM D 5420-04 to have a mean failure energy expressed as a function of specimen thickness of not less than 550 in. lbf/in. A

failure is noted when a crack is visible on either surface or when any brittle splitting is observed on the bottom plaque in the specimen

10. Accelerated Aging and Freeze Thaw Test of Tile and Adhesive System when tested to ASTM D 1037-99 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other detrimental defects.
11. Accelerated Weathering: Delta-E of less than 4.5 at 3,000 hours exposure, when tested in accordance with ASTM G155-05a,as well as no deterioration, fading or chalking of surface of tile color No 33538.
12. Loading: AASHTO HB-17 single wheel HS20-44 loading "Standard Specifications for Highways and Bridges". The Cast In Place Tile shall be mounted on a concrete platform with a ½" airspace at the underside of the tile top plate then subjected to the specified maximum load of 10,400 lbs., corresponding to an 8000 lb individual wheel load and a 30% impact factor. The tile shall exhibit no visible damage at the maximum load of 10,400 lbs
13. Salt and Spray Performance: No deterioration or other defect after 200 hours of exposure, when tested in accordance with ASTM B117-03.
14. Embedment flange spacing shall be no greater than 3.1" center to center spacing as illustrated on the product Cast In Place drawing
15. Installation Method: Cast in place replaceable.
16. Shape: Rectangular.
17. Dimensions: 24 inches by 36 inches (610 mm by 914 mm).
18. Color: FED-STD 595C, Table IV, Safety Red No. 31350. Color shall be homogeneous throughout the tile.
19. Products:
    a. Armor-Tile, a brand of Engineered Plastics, Inc; Cast in Place Tactile Panel for Transit: www.armortile.com.

2.2 ACCESSORIES

A. Fasteners: ASTM A666, Type 304 stainless steel
   1. Type: Countersunk, color matched composite sleeve anchors
   2. Size: 1/4 inch (6.35 mm) diameter and 1-1/2 inches (38 mm) long.

PART 3 EXECUTION

3.1 EXAMINATION

A. When installation location is near site boundary or property line, verify required location using property survey.

B. Verify that work area is ready to receive work:
   1. If existing conditions are not as required to properly complete the work of this section, notify Construction Manager.
   2. Do not proceed with installation until deficiencies in existing conditions have been corrected.

C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.2 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's written instructions.
   1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
   2. Do not install when ambient or substrate temperature has been below 40 degrees F (4 degrees C) during the preceding 8 daylight hours.

B. Field Adjustment:
   1. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
   2. Orient so dome pattern is aligned with the direction of ramp.

3. Align truncated dome pattern between adjacent units.

C. Install units fully seated to substrate, square to straight edges and flat to required slope.

3.3 INSTALLATION, CAST IN PLACE PLASTIC TILES

A. Concrete:
1. See Section 03 3000.

B. When installing multiple adjacent units, leave a 3/16 inch (5 mm) gap between units to allow for expansion.

C. Tamp and vibrate units as recommended by manufacturer.

D. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

E. During Cast In Place Detectable/Tactile Warning Surface Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

F. Prior to placement of the Cast In Place Detectable/Tactile Warning Surface Tile system, review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.

G. The physical characteristics of the concrete shall be consistent with Section 32 1313 - Concrete Paving and Curbs. An overly wet mix will cause the tile to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (25 lb) shall be placed on each tile.

H. The concrete pouring and finishing operations require typical mason's tools, however, a 4' long level with electronic slope readout, 25 lb. weights, and a large non-marring rubber mallet are specific to the installation of the Cast In Place Detectable/Tactile Warning Surface Tile system. A vibrating mechanism such as that manufactured by Vibco can be employed, if desired. The vibrating unit should be fixed to a soft base such as wood, at least 1 foot square.

I. The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.

J. When preparing to set the tile, it is important that no concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.

K. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawings. The Cast In Place Detectable/Tactile Warning Surface Tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes

L. In cold weather climates it is recommended that the Cast In Place Detectable/Tactile Warning Surface Tiles be set deeper such that the top of domes are level to the adjacent concrete on the top and sides of ramp and that the base of domes to allow water drainage. This installation will reduce the possibility of damage due to snow clearing operations.

M. Immediately after placement, the tile elevation is to be checked to adjacent concrete. The elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.

N. While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile. L. During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external forces placed on the tile that may rock the tile causing a void between the underside of tile and concrete.

O. Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 25 lb each may be required to be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.

P. Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.

Q. Individual tiles to be bolted together using ¼ inch or equivalent hardware. This will ensure that adjacent tiles are flush to each other during the installation process. Use tape or caulking on the underside of the bolted butt joint to ensure that concrete does not rise up between the tiles during installation. Any protective plastic wrap which was peeled back to facilitate bolting or cutting, should be replaced and taped to ensure that the tile surface remains free of concrete during the installation process.

R. Tiles can be cut to custom sizes, or to make a radius, using a continuous rim diamond blade in a circular saw or mini-grinder. Use of a straightedge to guide the cut is advisable where appropriate.

S. Any sound-amplifying plates on the underside of the tile, which are dislodged during handling or cutting, should be replaced and secured with construction adhesive. The air gap created between these plates and the bottom of the tile is important in preserving the sound on cane audible properties of the Armor-Tile system as required in various jurisdictions.

3.4 CLEANING PLASTIC UNITS

A. Remove protective plastic sheeting within 24 hours of installation.

B. Remove excess sealant or adhesive from joints and edges.

C. Clean four days prior to date of scheduled inspection.

3.5 PROTECTION

A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.

B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

END OF SECTION

EROSION CONTROL AND INSPECTIONS OF SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.
   1. Coordinate with Section 01 5713.

1.2 DESCRIPTION OF WORK

A. The contractor shall provide all labor, materials, equipment and services to install all erosion control measures as specified herein or as specified on the drawings.

B. It is the intent of this specification to effectively eliminate erosion and to prevent sediment from reaching the existing storm drainage system through the use of stone sediment filters, sediment basins, silt fencing and other methods.

1.3 REFERENCES

A. All erosion control measures shall be as specified herein, or detailed on the drawings, and as described in the New York State guidelines for Urban Erosion and Sediment Control, and shall conform to the standards of Westchester County Soil and Erosion Control Commission and to the NYS Department of Environmental Conservation.

B. Refer to the Erosion and Sediment Control Plan prepared for this project which outlines the erosion and sediment controls and installations required for this work.

1.4 SUBMITTALS

A. Submit shop drawings for all erosion control devices.

PART 2 PRODUCTS

2.1 MATERIALS

A. Silt fencing, straw bale sediment barrier, sediment basin or trap, stabilized construction entrance and dust control shall be as detailed in the N.Y.S. Manual.

B. Topsoil Stockpile
   1. Stockpiles of soil shall be protected from wind and water erosion. Stockpile shall be located on level, dry ground.
   2. Cover stockpiles with tarps or temporary seeding.
   3. All stockpiles shall be surrounded by straw bale sediment barriers and/or silt fencing properly installed.
   4. Stockpile side slopes shall not exceed 2:1.

C. Erosion control blanket shall be #S150, as manufactured by North American Green, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anti Tracking Pad: Construct site access (at each entrance) as an “anti-tracking pad” a minimum of 25 feet in width by at least 50 feet in length. Construction to be of a layer of filter fabric over existing or revised grade followed by a 2 course installation of 6” - 9” sized stone. Area shall be maintained throughout the entire period; “pad” to be removed and curb/walk/green strip to be restored under ensuing contract.

B. Install silt fencing, straw bale sediment barriers, sediment basins, stabilized construction entrance, topsoil stockpile and protection, where indicated on the drawings, or as described here, all in accordance with the N.Y.S. Manual

C. Silt fence shall be installed as required. Fabric shall be embedded in a 6 inch deep trench with tamped compacted backfill. Stakes shall be spaced as shown.

D. On slopes equal to or greater than 3:1, Install erosion blanket on graded slopes immediately after seeding has occurred, or not less than 24 hours after slope has been graded. Install as per manufacturer's recommendations.

3.2 MAINTENANCE

A. All erosion control measures shall be inspected and repaired as required on a weekly basis and after each storm. Repairs shall be made promptly to prevent downstream erosion and siltation.

B. Inlet traps and inlet protection devices shall have all sediment removed when the volume of storage is half full. Gravel filter shall be replaced following significant events and when flow begins bypassing structure.

C. Contractor shall provide to the Owner's Representative, weekly copies of a report for his inspection, findings and action taken.

END OF SECTION

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Posts, rails, and frames.

B. Wire fabric.

C. Excavation for past bases, concrete foundations for posts.

D. Manual gates with related hardware.

E. Accessories.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.4 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).

D. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.

E. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric; 2017.

F. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2016.

G. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.

H. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.

I. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing; 2018.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.

D. Samples: Submit two samples of fence fabric, slat infill, 12 inch (- mm) by 12 inch (- mm) in size illustrating construction and colored finish.

E. Manufacturer's Installation Instructions: Indicate installation requirements

F. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines .

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 MATERIALS

A. Posts and rails shall be standard weight galvanized steel pipe of the sizes shown on the plans and shall conform to ASTM Serial Designation F-1083, Schedule 40. Posts and rails shall be galvanized in accordance with ASTM Serial Designation 1-123.
   1. All posts and rails shall have a minimum 10 mil polyvinyl chloride coating meeting the requirements below. Color to match fabric.

B. Wire Fabric: 6ga. bonded black vinyl coated, ASTM668,Type 2B, 7 mil thermally fused PVC over galvanized steel chain link fabric.

C. Concrete: Type specified in Section 03 3000.

2.2 COMPONENTS

A. Line Posts: 1.9 inch (48 mm) diameter.

B. Corner and Terminal Posts: 2.38 inch (60 mm) diameter.

C. Gate Posts: 3-1/2 inch (89 mm) diameter.

D. Top and Brace Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.

E. Bottom Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.

F. Fabric: 2 inch (51 mm) diamond mesh interwoven wire, 6 gage, 0.1620 inch (4.12 mm) thick, top selvage knuckle end closed, bottom selvage twisted tight. Coated with 7 mil PVC.

G. Tension Wire: 6 gage, 0.1920 inch (4.9 mm) thick steel, single strand.

H. Tie Wire: Aluminum alloy steel wire.

2.3 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches (1525 mm) high, 3 for taller gates; fork latch with gravity drop and double padlock hasp; keeper to hold gate in fully open position.

B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches (1525 mm) high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, double padlock hasp; keepers to hold gate in fully open position.

C. Hinges: Finished to match fence components.
   1. Brackets: Round.
   2. Mounting: Center.
   3. Closing: Manual.

D. Latches: Finished to match fence components.
   1. Brackets: Round.

E. Gates shall be furnished and installed where indicated on the plans or directed by the Construction Manager. All necessary fittings and gate holders to lock gates in both open and closed positions shall be furnished. The locking device shall be entirely enclosed as shown on the plans or shall be an approved equal locking device. Gates shall be constructed of the same materials and finishes as the fence. All gates shall be braced with truss rods and turnbuckles. All gates shall be so arranged that they can be locked when closed and locked back to the fence when open.

F. Owner will furnish padlocks.

2.4 ACCESSORIES

A. Caps: Molded rigid vinyl; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Privacy Slats: Vinyl strips, sized to fit fabric weave.

2.5 FINISHES

A. Components and Fabric: 5 ga. Bonded Vinyl coated, over coating of 1.8 oz/sq ft (550 g/sq m) galvanizing, on 6 ga. core.

B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

C. Accessories: Same finish as framing.

D. Color(s): Black.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris and _____.

3.2 PREPARATION

A. Ground Preparation.

3.3 INSTALLATION

A. Scape, wire brush and sand all existing fence posts and components free of all rust , oils, laitance, etc; to provide a surface acceptable to the paint manufacturers requirements, to receive new prime and paint coatings.

B. Install framework, fabric, accessories and gates in accordance with ASTM F567.

C. Place fabric on inside of posts and rails.

D. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

E. Line Post Footing Depth Below Finish Grade: 3.5 feet (1.07 m).

F. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: 3.5 feet (1.07 m).

G. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

H. Provide top rail through line post tops and splice with 6 inch (150 mm) long rail sleeves.

I. Do not stretch fabric until concrete foundation has cured 28 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.

K. Position bottom of fabric 2 inches (50 mm) above finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches (380 mm) on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension wire stretched taut between terminal posts.

O. Do not attach the hinged side of gate to building wall; provide gate posts.

P. Install gate with fabric to match fence. Install hardware.

Q. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm).

B. Maximum Offset From True Position: 1 inch (25 mm).

C. Do not infringe on adjacent property lines.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:
   1. Hole diameter.
   2. Hole depth.
   3. Hole spacing.

D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of conformance against design.

E. Gates: Inspect for level, plumb, and alignment.

F. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.6 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material.

B. Clean fence with mild household detergent and clean water rinse well.

3.7 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION

RESTORATION OF TURF AREAS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The contractor shall supply all materials, equipment, labor, incidentals and maintenance required in order to provide an acceptable stand of turf by topsoiling and seeding of all disturbed areas including stripping topsoil, grading, placing topsoil, fertilizing and seeding, in accordance with the drawings and as specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil
   1. Stockpiled topsoil from site preparation, earthwork and trenching operations may be used.
   2. Topsoil shall not be used in a muddy or frozen condition.

B. Fertilizer: Commercial fertilizer (14-28-15) shall have the following composition by weight: Nitrogen 14%; Phosphorous 28%; Potash 14%; as manufactured by Jonathan Green “New Seeding Lawn Fertilizer”.

C. The seed used shall be fresh, re-cleaned seed of the latest crop containing a blend of those listed below and shall be harvested from one field to ensure a uniform color and texture. Percentages of each grass type are to be within the given range for that type:

D. Mulch: Mulch shall be approved salt hay or weed free straw and stabilized with a binder.

PART 3 - CONSTRUCTION

3.1 STRIPPING SOILRefer to Secton 02 0026

3.2 SEEDBED PREPARATION

A. Seasonal and weather limitations - All operations including seedbed preparation shall be performed only when the soil is in proper condition to permit satisfactory work. Continuation of work at other than specified times or conditions shall proceed only with consent of the Architect.

B. Leveling - Any undulations or irregularities in the surface resulting from fertilization, tillage or any other causes shall be leveled prior to seeding. Flooded, washed out, or otherwise damaged areas shall be reconstructed and all grades reestablished in conformance with the drawings and specifications.

C. Cleanup - Prior to seeding, the surface shall be cleared of all trash, debris and stone larger than 1-1/2 diameter and of all roots, brush, wire, grade stakes and other objects that could be a hindrance to maintenance operations and use.

D. Fertilizing - After final seedbed preparation, apply fertilizer at the manufacturer's recommended rate indicated on the bag. Fertilizer shall be distributed evenly over all areas to be seeded by machine, or as otherwise approved by the Architect, and shall be worked lightly into the top 1 inch of the rootzone mixture.

3.3 SEEDING

A. The contractor shall furnish and place all materials required for seeding in all top soiled areas.

B. All areas to be seeded shall be thoroughly disked or otherwise loosened to a depth of 4 inches and shall be raked to true lines free from all unsightly variations, bumps, ridges, or depressions. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil. Ground limestone and commercial fertilizer shall be applied as specified above.

C. The soil shall then be raked to a smooth, even draining surface and compacted with an approved roller as directed by the Architect. Any depressions which occur shall be regraded and rerolled until a satisfactory grade is obtained.

D. The rate of seeding shall be 10 lbs. per 1000 sq. ft. of area. Grass seed shall be sown by approved machine in such manner that a uniform stand will result and as indicated on the drawings for the upper field.

E. Grass seed shall be sown preferably in the fall between August 25 and October 1, in the spring between March 15 and May 1, or at such other times as are approved by the Architect. All seeding is to be done in dry or moderately dry soil and at times when the wind does not exceed a velocity of 5 miles per hour.

3.4 MULCHING

A. All seeded areas shall be mulched not later than three (3) days following seeding. Ground surfaces shall be completely covered at a rate of at least two (2) tons per acre.

B. Mulch shall be anchored using jute or other approved netting properly fastened in place.

C. Subsequent watering - Seed shall be watered as required to maintain adequate moisture in the soil. In the absence of rainfall, seed shall be watered at frequencies dictated by need.

3.5 ACCEPTANCE

A. Inspection of the work of seeding to determine provisional acceptance will be made by the Architect upon written notice requesting such inspection submitted by the contractor at least seven (7) days prior to the anticipated date of inspection. Request may be made subsequent to the second mowing of the turf.

B. After inspection the contractor will be notified in writing by the Architect of provisional acceptance of all work, or if there are any deficiencies of the requirements for completion of the work.

C. All seeded areas shall be guaranteed for one (l) growing season commencing with the date of provisional acceptance.

SECTION 33 3102

SANITARY MANHOLES

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Drainage Pipe Sanitary: Section 33 3103.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Precast Reinforced Concrete Manholes:
   1. Riser Sections: ASTM C 478.
   2. Joints Between Riser Sections-One of the following:
      a. Rubber Gaskets: ASTM C 443.
      b. Butyl Joint Sealant: ConSeal CS-202 by Concrete Sealants, Inc., 8917 S. Palmer Rd., P. O. Box 176, New Carlisle, OH 45344, (513) 845-8776.
   3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.
   4. Concrete Reinforcement:
      a. Welded Wire Fabric: ASTM A 185.
      b. Steel Bars: ASTM A 615, Grade 60.
   5. Steps:
      a. Reinforced Plastic: 1/2 inch steel reinforced (ASTM A 615, Grade 60) polypropylene, or other plastic material complying with DOT 725-02.01.
      b. Capable of withstanding a 300 lb concentrated live load without permanent distortion and with rungs a minimum 10 inches wide designed to prevent feet from slipping off the ends.

   6. Damp Proofing:
      a. Two (2) coats Sherwin Williams TarGuard Coal Tar Epoxy, or approved equal.

B. Cast-in-Place Concrete for Manhole Invert Channels: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi after 28 days.
   1. Design Air Content: 6 percent by volume plus or minus 1.5 percent.
   2. Cement: Minimum 610 pounds per cubic yard.
   3. Slump: Between 2 and 3 inches.

C. Frames and Covers for Manholes:
   1. Design of each shall be the same throughout the project unless otherwise specified or indicated on the drawings.
   2. Units shall meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
   3. Acceptable Manhole Frames and Covers: Pattern 1254 frame & cover as manufactured by Campbell Foundry Company, 800 Bergen Street, Harrison, New Jersey 07029, (973) 483-5480.
   4. Covers for sanitary manholes shall be clearly marked 'SEWER'.

D. Pipe-to-Manhole/Drainage Structure Connections-One of the following:
   1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., TullyCity, PA 19007, (215) 547-3366.
   2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.
   3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.
   4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

E. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.1 PREPARATION

A. Lateral Openings in Precast and Cast-in-Place Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.2 INSTALLATION

A. Construct concrete structures circular in form with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified. Install steps 12 inches oc from top to bottom and in a manner capable of withstanding a lateral pull of 1,000 lbs.
   1. Wall thickness: 6 inches.

B. Position tops of structures flush with finished grade.

C. Form inverts in manholes on straight runs by the use of channel pipe. Form inverts in manholes at changes in direction or grade by making curved channels of concrete. Channels shall have a smooth surface free from irregularities.

D. Cut laterals which will enter above the invert to correct length before installation. Do not cut after installation. Use ductile iron piping for drops.

END OF SECTION

SECTION 33 3103

DRAINAGE PIPE (SANITARY)

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Sanitary Manholes: Section 33 3101.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications including dimensions and strength for each type of pipe.

PART 2 PRODUCTS

2.1 DRAINAGE PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings: SDR-35, ASTM D 3034;

PART 3 EXECUTION

3.1 INSPECTION

A. Examine all pipe and fittings before installation. Remove defective pipe and fittings from the Site.

B. Do not backfill until inspected by the Owner's Representative.

3.2 GENERAL

A. Install pipe in accordance with manufacturer's recommendation and as specified in ASTM D 3034 (PVC) and ASTM D 3350 (HDPE).

B. HDPE pipe shall be installed without joints over the entire length.

C. All sanitary pipe shall be installed with 48-inches of cover.

3.3 INSTALLATION

A. Laying Pipe:
   1. Lay pipe to indicated line and grade with a firm uniform bearing throughout its length.
   2. Lay pipe with a uniform pitch between high and low points.
   3. Position bells upstream.

4. Provide sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with suitable material and tamp.

B. Joints:
1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
2. Install rubber gaskets in accordance with the manufacturer's specifications.

C. Connections:
1. All connections are to be installed in accordance with the manufacturer's recommendation.
2. Make connection to existing sewers by springing two or more joints and inserting a "Y" fitting. Remake all damaged existing joints.
3. Make connections to existing manholes by cutting into the floor or bench of the manhole and forming a new channel.
4. If the pipe, manholes or other structures with which connection is to be made has not yet been installed, install the pipe to a point directed by the Owner's Representative and plug or cap the end in a satisfactory manner.

END OF SECTION

SECTION 33 3913

DRAINAGE STRUCTURES WITH FRAMES AND COVERS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Corrugated Polyethylene Storm Drain Pipe: Section 33 4104.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of roadway.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Precast Reinforced Concrete Manholes:
   1. Riser Sections: ASTM C 478.
   2. Joints Between Riser Sections-One of the following:
      a. Rubber Gaskets: ASTM C 443.
      b. Butyl Joint Sealant: ConSeal CS-202 by Concrete Sealants, Inc., 8917 S. Palmer Rd., P. O. Box 176, New Carlisle, OH 45344, (513) 845-8776.
   3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.
   4. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

B. Precast Reinforced Square and Rectangular Concrete Structures:
   1. Riser Sections: ASTM C890.
   2. Keyed Joints:
      a. Joint Sealant - Select One:
         i. Mortar
         ii. Rubber Gasket
         iii. Butyl Joint Sealant
   3. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.
   4. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 3,500 psi after 28 days.

C. Frames, Covers and Grates for Manholes and Catch Basins:
   1. Design of each shall be the same throughout the project unless otherwise specified or indicated on the drawings.

2. Units shall meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
3. Material:
   a. Cast iron: ASTM A48, Class 30B or 35B.
   b. Delivered to Site free of any coatings, unless otherwise specified.
4. Frames:
   a. Manholes: Round with a 26-inch clear opening.
   b. Drain inlets:
      i. Rectangular with a 24-inch by 24-inch opening
5. Solid Covers:
   a. Round.
   b. Solid lid, top surface checkered and provided with suitable concealed lifting notches, and lettering cast into cover to indicate type of structure.
6. Grates:
   a. Rectangular.
7. Acceptable Manhole Frames and Covers: Pattern 1254 cover by Campbell Foundry Company, 800 Bergen Street, Harrison, NJ 07029, (973 483-5480
8. Acceptable Drain Inlet Frames and Gratings:
   a. Pattern 2815 by Campbell Foundry Company, 800 Bergen Street, Harrison, NJ 07029, (973) 483-5480

D. Pipe-to-Manhole/Drainage Structure Connections-One of the following:
1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.
2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.
3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.
4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

E. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.1 PREPARATION

A. Sewer Lateral Openings in Precast and Cast-in-Place Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.2 INSTALLATION

A. Construct concrete structures with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified.
1. Wall thickness for rectangular structures: 6 inches.

B. Position tops of structures flush with finished grade.

C. Cut laterals which will enter above the invert to correct length before installation. Do not cut after installation.

END OF SECTION

SECTION 33 3914

PLASTIC DRAINAGE STRUCTURES

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Corrugated Polyethylene Storm Drain Pipe: Section 33 4104.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturer: Nyloplast, 3130 Verona Ave, Buford, GA 30518

2.2 MATERIALS

A. Drain inlet shall be manufactured from PVC pipe stock.

B. Frame and Grate for plastic drain structures:
1. Design of each shall be ductile iron.
2. Design of each shall meet AASHTO H20 wheel loading requirements.
3. Grates shall be solid cover unless otherwise indicated on drawings.
4. Acceptable Frames and covers:
i. 18"-Diameter Structure:
a. Part# 1899CGC by Nyloplast, 3130 Verona Ave, Buford GA 30518
b. Part# 1899CGS by Nyloplast, 3130 Verona Ave, Buford GA 30518
ii. 24"-Diameter Structure: Part# 2499CGC by Nyloplast, 3130 Verona Ave, Buford GA 30518

2.3 TYPE AND FITTINGS

A. Pipe connection stubs shall be manufactured From PVC pipe stock.

B. Pipe connection stub shall be designed to form a watertight connection with pipes as specified on the plan.

PART 3 EXECUTION

3.1 INSTALLATION

A. Prepare ground and install the Work of This Section in accordance with the manufacturer's printed instructions

END OF SECTION

SECTION 33 3915

MECHANICAL SEPARATOR

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

C. Rejection – The Stormwater Treatment System may be rejected for failure to meet any of the requirements of this specification.

PART 2 PRODUCTS

2.1 MATERIALS

A. Approved Mechanical Separator: First Defense model FD-6 by Hydro International. 94 Hutchins Drive, Portland, ME 04102. (207)-756-6200

B. The treatment system shall be manufactured with materials typically used in stormwater drainage systems that have a minimum life expectancy of 30 years and meet the following requirements:
   a. Materials of construction shall be cross-linked polyethylene (XLPE) and/or Type 304 stainless steel or carbon steel powder coated in accordance with ASTM 775/ ASTM A775M. All components shall be designed to withstand normal loadings associated with fabrication, shipping, site installation, and normal operation of the equipment.
   b. Precast shall be manufactured with concrete that has attained a compressive strength of 4,000 psi after 28 days. The structure shall be reinforced to withstand an HS20-44 loading. Shiplap joints shall be sealed with butyl rubber mastic sealant conforming to ASTM C990. Slab tops shall be suitably reinforced and provided with manhole openings and covers as required. The cast iron manhole frames and covers shall be sized as per the manufacturer's drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.

C. Performance
   a. Performance of the treatment system shall be based on independent full-scale laboratory testing. The laboratory testing used as the basis of product performance shall be undertaken in accordance with testing protocols approved or endorsed by SWEMA or acceptable State agency, such as a State Department of Environmental Protection (DEP) or recognized verification agency (e.g.: ETV, NJCAT, NETE, MaSTEP).
   b. The Stormwater Treatment System shall have a sediment storage capacity of 89 cubic feet and be capable of capturing 420 gallons of petroleum hydrocarbons. The Stormwater Treatment System

shall have a treatment capacity of 2.2 cubic feet per second (cfs) and a peak online flow rate of 18.0 cubic feet per second (cfs). The Stormwater Treatment System shall be capable of removing floating trash and debris, floatable oils and 80% of total suspended solids from stormwater entering the treatment chamber.

c. Service access to the Stormwater Treatment System shall be provided via 30-inch inner diameter (ID) access riser(s) over the treatment chamber such that no confined space entry is required to perform routine inspection and maintenance functions.

D. Reinforced Concrete Pad:
   a. Dimensions: 6 foot diameter by 14in thick
   b. Reinforcement: #4 steel with 1 inch minimum.
   c. Strength: 3000 psi Minimum

E. Approved Manhole frame and cover: Standard traffic loading frame and cover for First Defense FD-6 as recommended by the manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

A. The trench and trench bedding shall be constructed according to ASTM A 798. The Swirl Concentrator shall be installed on a stable 6 inch base of fine readily compacted soil free of any foreign materials, stones larger than 3-in. in size or other contaminants.

3.2 INSTALLATION

A. Excavation and Bedding
   a. The precast concrete structure shall be set on a granular or compacted sand subbase in accordance with local requirements for standard manhole installation. In no instances shall the compacted sub-base material have a thickness of less than 12 inches.
   b. The Precast concrete structure shall be set plumb to within 0.5%.
   c. Non-shrink grout or hydraulic cement conforming to ASTM C 595 shall be used to provide a water tight seal in the lift holes, any drain holes and around the concrete knock-outs for the inlet and outlet pipes.
   d. The contractor shall be responsible for preparing the site for the system installation including, but not limited to, temporary shoring, excavation, cutting and removing pipe, new pipe, bedding, and compaction. The contractor shall be responsible for furnishing the means to lift the system components off the delivery trucks. The contractor shall be responsible for providing any concrete antifloatation/anti-creep restraints, anchors, collars, etc. with any straps or connection devices required. The contractor shall be responsible for sealing the pipe connections to the Stormwater Treatment System, backfilling and furnishing all labor, tools, and materials needed.

END OF SECTION

FOUNDATION SUBDRAINAGE SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Building Perimeter drainage systems.

B. Filter aggregate and fabric and bedding.

1.3 RELATED REQUIREMENTS

A. Section 07 1300 - Sheet Waterproofing for drainage board.

B. Section 07 2100 - Thermal Insulation for rigid insulation.

C. Section 31 2301 - Excavation, Backfill and Compaction: Excavating for subdrainage system piping and surrounding filter aggregate.

D. Section 33 4104- Corrugated Polyethylene Storm Drain Pipe

1.4 REFERENCE STANDARDS

A. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe drainage products, pipe accessories, filter fabric drainage board and insulation.

C. Shop Drawings: Indicate dimensions, layout of piping, high and low points of pipe inverts, gradient of slope between corners and intersections.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record location of pipe runs, connections, cleanouts and principal invert elevations.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer, with a minimum of 5 years experience, who has completed foundation drainage systems similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.7 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

1.8 COORDINATION

A. Coordinate foundation drainage system installation with excavating, trenching, and backfilling.

B. Coordinate drainage panel installation with waterproofing of walls below grade.

C. Coordinate piping termination with storm drainage system.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. Perforated, Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 2729, minimum 4" unless shown otherwise.

2.2 CLEANOUTS

A. Description: ASME A112.36.2M, with round-flanged, cast-iron housing, and secured, excoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

2.3 AGGREGATE AND BEDDING

A. Impervious Fill: Clayey gravel and sand mixture capable of compacting to dense state.

B. Drainage Fill: ¾" washed evenly graded mixture of crushed stone or crushed gravel.

2.4 ACCESSORIES

A. Pipe Couplings: Solid plastic.

B. Geotextile fabrics are specified in Section 31 2316 - Excavation.

C. Drainage panels are specified in 07 1300 - Sheet Waterproofing.

D. Rigid insulation is specified in 07 2100 - Thermal Insulation.

E. Wall Seals: "Flexural" 40-IRHD polymer size as required.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavated base is ready to receive work and excavations, dimensions, and elevations are as indicated on layout Drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over-excavation with compacted fill.

B. Remove large stones or other hard matter that could damage drainage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

A. Install and join pipe and pipe fittings in accordance with pipe manufacturer's instructions.

B. Place drainage pipe on compacted impervious fill.

C. Apply and compact impervious fill material to raise low areas or where unsatisfactory bearing soil may occur.

D. Use increases, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

1. Extend piping and connect to storm drainage system, of sizes and in locations indicated.

E. Install piping pitched down in direction of flow, at a minimum slope of 1 percent and with a minimum cover of 36 inches, except where otherwise indicated. Do not place piping above finish floor slab.

F. Place pipe with perforations facing down. Mechanically join pipe ends.

G. Install pipe couplings.

H. Instal geo-tech filter in accordance to Section 31 2301 - Excavation, Backfill and Compaction.

I. Place filter fabric over levelled top surface of aggregate cover prior to subsequent backfilling operations.

J. Place aggregate in maximum 4 inch (100 mm) lifts, consolidating each lift.

K. Refer to Section 31 2316 - Excavation for compaction requirements. Do not displace or damage pipe when compacting.

L. Place impervious fill over drainage pipe aggregate cover and compact.

M. Connect to storm sewer system with unperforated pipe, through installed sleeves.

3.4 FIELD QUALITY CONTROL

A. Section 01 4000 - Quality Requirements: Field inspection and testing.

B. Testing: Test drain piping with water or visually check piping to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

1. Place additional filtering material to depth of 8 inches around sides and top of drains after testing.

3.5 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.

END OF SECTION

SECTION 33 4104

CORRUGATED POLYETHYLENE STORM DRAIN PIPE

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications (AASHTO M-252 or AASHTO M-294), including dimensions, allowable height of cover information, and installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Advanced Drainage Systems, Inc., 3300 Riverside Dr., Columbus, OH 43221; (614) 457-3051.

B. Hancor, Inc., 401 Olive St., Findlay, OH 45840; (800) 847-5880.

2.2 MATERIALS

A. Corrugated Polyethylene Pipe (Smooth Interior): Conform to AASHTO M-294 (12 to 42-inch diameter).
   1. Coefficient of Roughness (interior pipe surface): 0.012 maximum (Manning formula).
   2. Classification: Type S.
   3. Minimum Pipe Stiffness Values:

DIAMETER	PIPE STIFFNESS (PER ASTM D 2412)
4", 6", 8", 10", 12"	50 psi
15"	42 psi
18"	40 psi
24"	34 psi
30"	28 psi
36"	22 psi
42"	20 psi

   4. Joint Couplings: Polyethylene Couplers; snap-on type or split collar through 24-inch diameter, screw-on type where applicable.
      a. Corrugated to match pipe corrugations, width not less than one half pipe diameter.
      b. Split couplings shall engage an equal number of corrugations on each side of the joint.
   5. Joint Couplings: Polyethylene, bell-and-spigot type couplers utilizing an elastomeric gasket conforming to ASTM F 477.

B. Fittings:
   1. High density polyethylene meeting the properties specified for the pipe.
   2. Either molded or fabricated.
   3. Designed specifically for the pipe furnished and manufactured by the pipe manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Laying: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Fill excess excavation with suitable materials and tamp.

B. Joints: Install coupling and fasten per manufacturer's instructions.

C. Connections:
   1. Make connections to existing pipe by using a galvanized steel "dimple"-type coupling. Remake damaged existing joints.
   2. Make connections to existing manholes and drainage structures by cutting into the floor or bench of the manhole or drainage structure and forming a new channel.
   3. If the pipe, manholes or other structures with which connections are to be made have not yet been installed, install the pipe to a point directed by the Owner's Representative and plug or cap the end in a satisfactory manner.

END OF SECTION

SECTION 33 4914

PLASTIC DRAINAGE CHAMBERS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Backfill and Compaction: Section 31 2301.

B. Corrugated Polyethylene Storm Drain Pipe: Section 33 4104.

1.2 DEFINITIONS

A. Plastic Drainage Chambers: High density polyethylene chambers, manufactured and designed to detain, or retain for recharge, storm water for the purpose of controlled run-off and/or infiltration back into the soil.

1.3 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions.
1. Include pertinent information regarding dimensions and fittings.

1.4 QUALITY ASSURANCE

A. Testing Requirements: In ground structural tests shall have been performed by a registered Professional Engineer and meet an AASHTO rating of H-20 (32,000 lbs/axle) with 18 inches of cover.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturer: Cultec INC, 878 Federal Road, Brookfield CT 06804.

2.2 MATERIALS

A. Plastic leaching chambers shall be manufactured from high density polyethylene.

B. The density of polyethylene raw material shall be a minimum of .959 g/cm3 - ASTM D1248, D1505.

2.3 TYPE AND FITTINGS

A. Provide high capacity units of plastic arch shape, open-bottomed chamber with side wall openings. Nominal unit dimensions shall be 30.5 inches high x 52 inches wide x 102 inches long.

B. Each unit shall have a minimum storage capacity of 52.21 cubic feet per unit.

C. Each unit shall contain 56 discharge holes in the side wall to promote the lateral flow of water.

D. Each chamber shall have an access port at the top of the arch in the center of the unit to allow access to the unit.

E. End units shall be a continuously formed unit. End plates may not be used.

F. Inlet pipes shall be cut into the endcaps at the location specified by the manufacturer for the pipe size used.

PART 3 EXECUTION

3.1 INSTALLATION

A. Prepare ground and install the Work of this Section in accordance with the manufacturer's printed instructions.

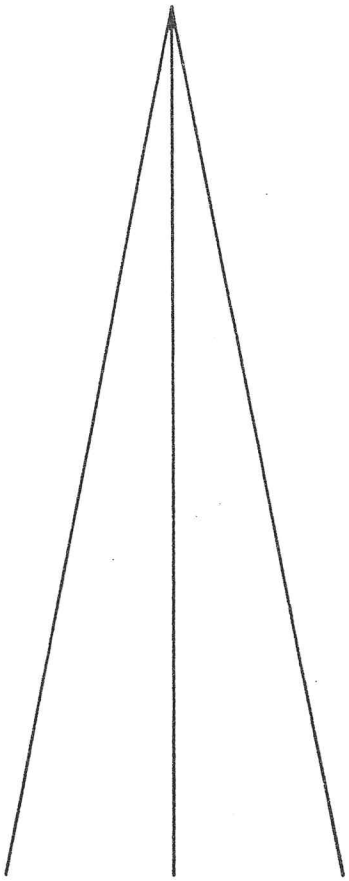
END OF SECTION

APPENDIX

- GEOTECHNICAL REPORT
- BORINGS
- LIMITED ASBESTOS SURVEY & LEAD-BASED PAINT INSPECTION
- 155.5 UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE

SOILTESTING, INC.

TO Fuller & D'Angelo DATE December 20, 2016.
ADDRESS 45 Knollwood Road, Elmsford, NY 10523
SITE LOCATION Port Chester High School, 1 Tamarack Road, Port Chester, NY
REPORT SENT TO Joseph Fuller, Jr., AIA
SAMPLES SENT TO Storage (Max. 60 days)



90 Donovan Road
Oxford, Connecticut 06478-1028
203-262-9328

Branch Office:
White Plains, New York 10607
914-946-4850

JOB NO.
G248-0575-16

Phone
(203) 262-9328

Telefax
(203) 264-3414

WHITE PLAINS, N.Y.
(914) 946-4850

SOILTESTING, INC.

90 DONOVAN ROAD - OXFORD, CONN. 06478-1028

GEOTECHNICAL / ENVIRONMENTAL SUBSURFACE INVESTIGATIONS - Test Borings - Core Drilling
Monitoring Wells - Recovery Wells - Direct Push/Probe Sampling
UNDERPINNING - HELICAL PILES - SOIL NAILS

December 20, 2016

Fuller & D'Angelo
45 Knollwood Road
Elmsford, NY 10523
914-592-4444

Attn: Joseph Fuller, Jr., AIA

Re: Port Chester High School **G248-0575-16**
1 Tamarack Road
Port Chester, NY

Dear Mr. Fuller,

Enclosed are boring logs and location plan for the above referenced project site.

Also enclosed is a geotechnical report completed by The Geotechnical Department, LLC.

If you have any questions, please do not hesitate to contact us.

Very truly yours,
SOILTESTING, INC.

James A DeAngelis

James A. DeAngelis
President

JAD:ec

SOILTESTING, INC. 58th ANNIVERSARY 1958 OXFORD, CT 2016

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Fuller & D'Angelo	SHEET 1 OF 1 HOLE NO. B-1 & B-2
	PROJECT NO. G248-0575-16	
	PROJECT NAME Port Chester High School	BORING LOCATIONS per Plan
FOREMAN - DRILLER TP/ad	LOCATION 1 Tamarack Road, Port Chester, NY	
INSPECTOR	CASING / SAMPLER / CORE BAR: TYPE HSA / SS; SIZE I.D. 4 ¼" / 1 3/8"; HAMMER WT. 140# BIT; HAMMER FALL 30"	OFFSET DATE START 12/10/16 DATE FINISH 12/10/16 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT 3 FT AFTER 0 HOURS AT __FT AFTER __HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18			CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	12"	2'0"	-	10			dry/moist		6" ASPHALT / 4" GRAVEL BASE
							8	75			compact	1'6"	Rusty Brn FM SAND, sm F gravel, lit silt, tr weathered rock frags
													Gry partially weathered BEDROCK
5		2	ss	1"	1"	4'1"	100/1"				wet v dense	4'1"	weathered BEDROCK AUGER REFUSAL
													E.O.B. 4'1"
10													

GROUND WATER OBSERVATIONS
AT none FT AFTER 0 HOURS
AT __FT AFTER __HOURS

0	B-2												B-2
		1	ss	24"	19"	2'6"	6	7			dry	1'6"	6" ASPHALT Gry FC GRAVEL, lit silt
							8	60			compact	2'0"	Brn FM SAND, sm F gravel, silt, tr weathered rock frags
5													Gry partially weathered BEDROCK
		2	ss	1"	1"	5'1"	100/1"				v dense	5'1"	AUGER REFUSAL
													E.O.B. 5'1"
10													
15													
20													
25													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-1 & B-2**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS
SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER
PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%
C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Fuller & D'Angelo	SHEET 1 OF 1 HOLE NO. B-3 & B-4
	PROJECT NO. G248-0575-16	
	PROJECT NAME Port Chester High School	BORING LOCATIONS per Plan
FOREMAN - DRILLER TP/ad	LOCATION 1 Tamarack Road, Port Chester, NY	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 12/10/16
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 12/10/16
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	15"	2'0"	2 / 3 5 / 15		dry/moist stiff		1' TOPSOIL Brn SILT, sm FM sand, lit F gravel, tr weathered cobble
5										5'0"	tr brick from 1 - 5' (fill)
		2	ss	24"	6"	7'0"	5 / 2 6 / 7		dry/moist loose	8'0"	Brn FM SAND, lit silt, F gravel, tr weathered rock (fill)
10										10'0"	BOULDER (poss fill)
		3	ss	24"	21"	12'0"	2 / 4 5 / 7		dry stiff	11'0"	Ornge Brn SILT, lit FM sand, tr F gravel
15										13'6"	Brn Gry SILT & FM SAND, lit F gravel partially weathered BEDROCK AUGER REFUSAL BEDROCK
											E.O.B. 13'6"

GROUND WATER OBSERVATIONS
AT none FT AFTER 0 HOURS
AT FT AFTER HOURS

B-4

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
0		1	ss	24"	13"	2'0"	10 / 12 3 / 7		dry/moist loose		1' TOPSOIL Brn FM SAND, lit F gravel, silt
5		2	ss	17"	15"	5'5"	19 / 15 100/5"		lt moist hard	5'0"	Rusty Brn SILT & FM SAND, lit F gravel, tr weathered rock frags
										6'6"	Ornge Brn partially weathered BEDROCK AUGER REFUSAL
10											**E.O.B. 6'6"**
15											
20											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-3 & B-4**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Fuller & D'Angelo	SHEET 1 OF 1 HOLE NO. B-5
	PROJECT NO. G248-0575-16	
	PROJECT NAME Port Chester High School	BORING LOCATIONS per Plan
FOREMAN - DRILLER TP/ad	LOCATION 1 Tamarack Road Port Chester, NY	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 12/10/16
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 12/10/16
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
											3" ASPHALT
		1	ss	24"	18"	2'3"	4 / 5 6 / 6		dry stiff		Brn SILT & FM SAND, lit F gravel, tr cobbles
5		2	ss	24"	16"	7'0"	7 / 7 10 / 8		dry compact		Rusty Brn FM SAND, lit silt, tr F gravel
										8'6"	
10		3	ss	2"	2"	10'2"	100/2"		hard	10'6"	poss weathered BEDROCK partially weathered BEDROCK AUGER REFUSAL
											E.O.B. 10'6"
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-5**

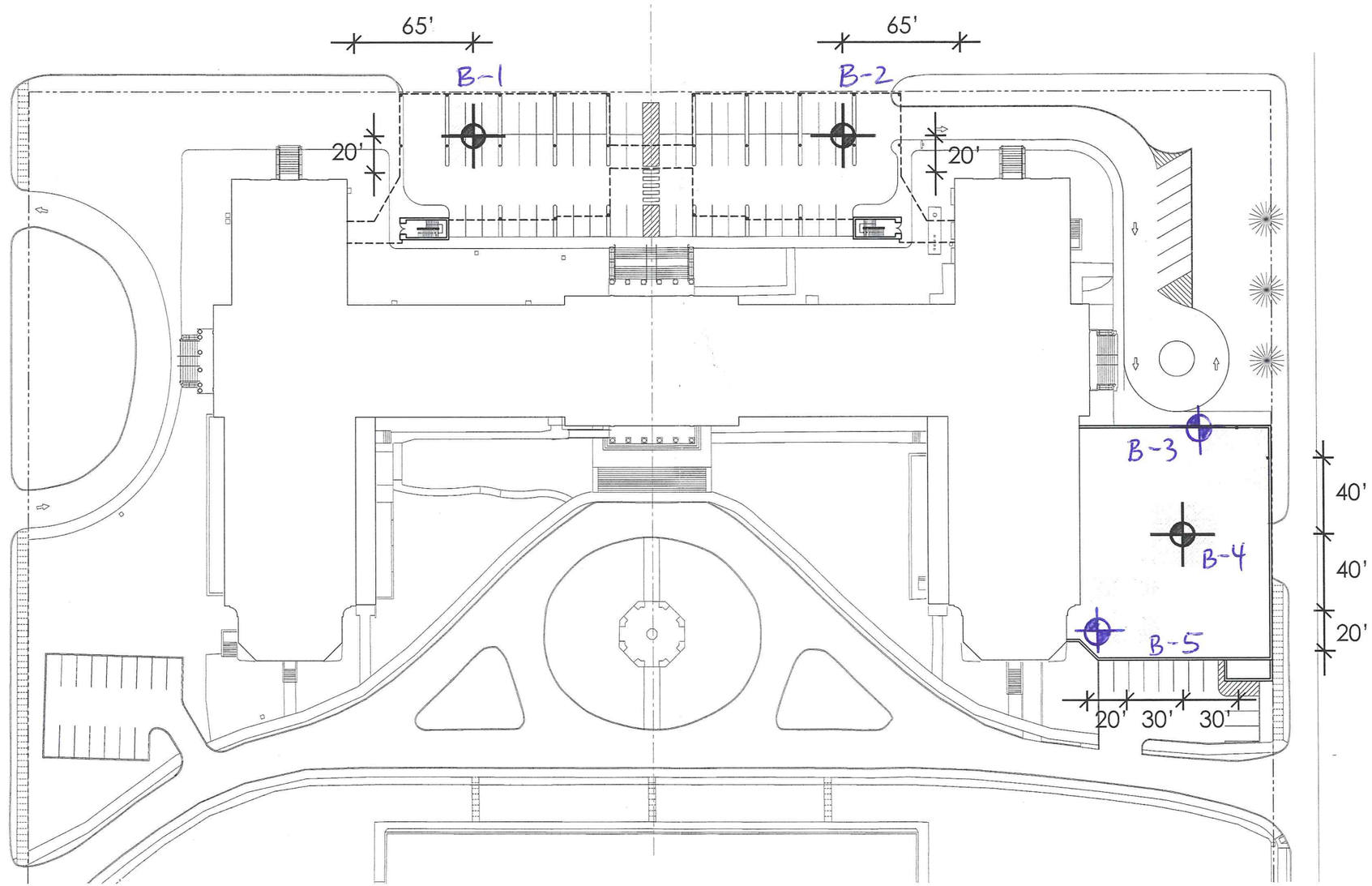
A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE



JOB NO.
G248-0575-16

SOILTESTING, INC.
90 Donovan Road
Oxford, CT 06478

HIGH SCHOOL

FULLER D'ANGELO P.C.
ARCHITECTS PLANNERS

Geotechnical Engineering Report

by

The Geotechnical Department, LLC

for

Soiltesting, Inc.

Dated: December 20, 2016

Fuller & D'Angelo

G248-0575-16

The Geotechnical Department, LLC

Consulting Engineers

41 Blanche Avenue, Demarest, NJ 07627

201-784-4444 • Fax: 201-768-0222

December 20, 2016
Project No. 2299

Fuller & D'Angelo, P.C,
45 Knollwood Road
Elmsford, New York 10523

Attn: Joseph Fuller

Re: Preliminary Geotechnical Engineering Report
Proposed Renovations and Additions
Port Chester High School
1 Tamarack Road
Port Chester, New York

This preliminary report is submitted as per our agreement with Soiltesting, Inc. and the attached "Geotechnical Limitations." It excludes environmental issues. It includes our findings and conclusions related to the geotechnical aspects of design and construction of foundations for the proposed structures.

Five (5) test borings were completed by Soiltesting, Inc. on December 10, 2016. Boring Nos. B-1 and B-2 are located in the area of the proposed addition to the west side of the existing plan. Boring Nos. B-3 to B-5 are in the proposed addition footprint at the north side The boring location plan and record sheet for each boring are attached to this report. The above information was used to evaluate the subsurface conditions and prepare this report.

Subsurface conditions in the proximity of the borings are summarized below for the west and north additions.

West Addition (Boring Nos. B-1 and B-2);
Gravel and sand exist beneath six (6) inches of bituminous concrete pavement to depths that range from one-foot-six- inches (1'6") to two (2) feet. Weathered rock continues the profile to refusal depths that range from four (4) to five (5) feet. The refusal depth is defined as the depth where no further penetration can be achieved with earth drilling and sampling procedures. Rock core drilling would be necessary to define whether the refusal depth is cobbles, boulders or bedrock. At completion, water was observed at a depth of three (3) feet in Boring No. B-1.

North Addition (Boring Nos. B-3 to B-5);
Man-made fill, possibly the backfill for the exiting building, consists of loose sand and silt with gravel and occasional cobbles and boulders to a depth of ten (10) feet at Boring No. B-3. Weathered rock continues the profile to refusal at thirteen-feet-six-inches (13'6"). No water was observed in the boreholes

The following were considered in developing the geotechnical conclusions:

1. An aerial photograph of the school campus showing the proposed addition.
2. A first floor sketch plan prepared by your office.
3. The design and construction shall be completed in accordance with the Building Code of New York State (Code).

The existing soil conditions indicate that the foundations for the additions can be conventional spread footings bearing below the topsoil, pavement and man-made fill. Foundations bearing at basement levels will encounter refusal, which could be rock or boulders. Combined soil and rock bearing should be avoided as the differential movement could cause cracking damage. Therefore, where the rock is engaged it should be further excavated to allow placement of a compacted controlled fill soil cushion. Slabs and pavements should bear on compacted quality fill that replaces the topsoil, pavement and unsuitable man-made fill.

Basement and below grade spaces could engage groundwater. The groundwater appears to be storm water randomly perched on the semi-pervious weathered rock deeper in the profile. Test pits could be used to better define the groundwater conditions and whether construction dewatering and permanent waterproofing should be considered.

The following preliminary design conclusions are offered:

1. Use spread footing foundations bearing on the undisturbed soil, at least one (1) foot of compacted Select Fill cushion over rock or boulders at least four (4) feet below the final grades as frost protection and at the same level or deeper than existing adjacent footings.
2. Use a soil bearing capacity of four thousand (4,000) pounds per square foot (psf).
3. Use compacted Select Fill to backfill basement walls and replace in-place unsuitable topsoil and pavement from beneath slabs and pavements.

4. Select Fill should be a well-graded sand and gravel, free of debris and organic material, with a maximum particle size of three (3) inches, between ten percent (10%) and seventy percent (70%) by weight passing the Standard No. 40 sieve size and less than twelve percent (12%) passing the No. 200 sieve.
5. Use the following soil parameters for design of basement walls backfilled with compacted Select Fill:

   Friction Angle (Φ).....35 degrees
   Unit Weight..... .125 pcf* above groundwater
   .....80 pcf below groundwater

   ** Pounds per cubic foot (pcf)*
6. Use Site Class C in accordance with the Code for seismic design considerations.

We trust these conclusions will allow you to complete your planning and preliminary design. Further, we are available to review and refine the above and develop final design and construction recommendations.

Very truly yours,
The Geotechnical Department, LLC

Thomas H. Otto, P.E.

Attachments: Boring Location Plan
Boring Record Sheets
Geotechnical Limitations

CC: Soiltesting, Inc.

GEOTECHNICAL LIMITATIONS

Explorations

- The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between and apart from these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.
- The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic.
- Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time measurements were made. More precise determinations of groundwater levels would require the installation of groundwater observation wells and water level readings taken over an extended period of time.

Review

- In the event that any changes in the nature, design or location of the proposed building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by this firm. Further, it is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

- It is recommended that this firm be retained to provide geotechnical engineering services during construction of the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

Use of Report

- This report has been prepared for the exclusive use of Fuller & D'Angelo, PC for specific application to construction at 1 Tamarack Road in Port Chester, New York in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
- This report is for *design* purposes only and is not sufficient to prepare construction cost estimates or bids.

ENVIRONMENTAL CONSULTING AND TECHNICAL SERVICES

Limited Asbestos Survey & Lead-Based Paint Inspection

PROJECT #:
065.01.62

DATE:
August 10, 2017

CLIENT:
Port Chester-Rye UFSD
113 Bowman Avenue
Port Chester, NY 10573

LOCATION:
Port Chester High School
1 Tamarack Road
Port Chester, NY 10573

PROJECT COMPLETION DATE:
July 10, 2017

warrenpanzer
environmental management consulting services
228 East 45th Street
New York, NY 10017
T. 212.922.0077
F. 212.922.0630
info@warrenpanzer.com

TABLE OF CONTENTS

1. Introduction

On July 10, 2017, Warren & Panzer Engineers, P.C. (Warren Panzer) conducted a limited asbestos survey and investigation for lead based paint in building areas anticipated to be affected during the planned building expansion for Port Chester High School, 1 Tamarack Road, Port Chester, New York. Warren Panzer was directed to the specific areas with the aid of drawings provided by the Port Chester/Rye UFSD. Warren Panzer Inspector Robert Treglio and Octavius Whitehead sampled suspected asbestos containing materials (ACM) and paint which was anticipated to be disturbed or posed the potential for disturbance during the planned construction activities.

2. Limited Asbestos Survey

During the limited asbestos survey, Warren Panzer identified several suspect materials that might contain asbestos. These materials were as follows:

Table 1: Summary of Asbestos Analytical Results

Homogenous Material	Location	Material	Asbestos Content
01-01	Basement - Custodian Center – 8" pipe run	Fiberglass pipe insulation wrap	NAD
01-02	Basement - Custodian Center – 3" pipe run	Fiberglass pipe insulation wrap	NAD
01-03	Basement – vertical pipe by NE entrance to grounds	Fiberglass pipe insulation wrap	NAD
01-04	Basement – Boiler Room	Fiberglass pipe insulation wrap	NAD
02-05	Basement – Boiler Room, N. wall east	CMU mortar	NAD
02-06	Basement – Boiler Room, N. wall west	CMU mortar	NAD
03-07	Basement – Boiler Room, Boiler breach	Fiberglass duct insulation wrap	NAD
03-08	Basement – Boiler Room, Boiler breach	Fiberglass duct insulation wrap	NAD
03-09	Basement – Boiler Room, Boiler breach	Fiberglass duct insulation wrap	NAD
04-10	Basement – Boiler Room, ceiling mounted duct work	Thermal duct insulation	NAD
04-11	Basement – Boiler Room, ceiling mounted duct work	Thermal duct insulation	NAD
04-12	Basement – Boiler Room, ceiling mounted duct work	Thermal duct insulation	NAD
05-13	Exterior north wall	Brick mortar	NAD
05-14	Exterior north wall	Brick mortar	NAD
06-15	Exterior north windows – east side	Window caulk	NAD
06-16	Exterior north windows – west side	Window caulk	NAD
07-17	**Basement – Coaches' Office**	**Vinyl FT (12"x12"-blue)/mastic**	**Chrysotile 2%**
07-18	**Basement – Coaches' Office**	**Vinyl FT (12"x12"-blue)/mastic**	**NA/PS**
08-19	Basement – NE Boys Locker Room	Cove base (black)/glue	NAD

Homogenous Material	Location	Material	Asbestos Content
08-20	Basement – Coaches' Office	Cove base (black)/glue	NAD
09-21	Basement – south Locker Room	Ceramic wall tile grout	NAD
09-22	Basement – NE Boys Locker Room	Ceramic wall tile grout	NAD
10-23	Basement – NE Boys Locker Room	Ceramic floor tile grout	NAD
10-24	Basement – south Locker Room	Ceramic floor tile grout	NAD
11-25	Basement – Coaches' Office	Wall/ceiling plaster (white & brown composite)	NAD
11-26	Basement – south Locker Room	Wall/ceiling plaster (white & brown composite)	NAD
11-27	Basement – NE Boys Locker Room	Wall/ceiling plaster (white & brown composite)	NAD
11-28	Basement – NE outdoor entrance by Room B116	Wall/ceiling plaster (white & brown composite)	NAD
11-29	2nd Floor – Wrestling Room	Wall/ceiling plaster (white & brown composite)	NAD
11-30	1st Floor – Room 152	Wall/ceiling plaster (white & brown composite)	NAD
11-31	2nd Floor – Room 200	Wall/ceiling plaster (white & brown composite)	NAD
12-32	Basement – Coaches' Bathroom	Ceiling tile (2'x4')	NAD
12-33	Basement – NE Boys Locker Room	Ceiling tile (2'x4')	NAD
13-34	2nd Floor – Wrestling Room	Dry Wall	NAD
13-35	1st Floor – Room 153	Dry Wall	NAD
14-36	1st Floor – Room 152	Vinyl FT (12"x12"-beige & gray in checker pattern)/mastic	NAD
14-37	2nd Floor – Room 200	Vinyl FT (12"x12"-beige & gray in checker pattern)/mastic	NAD
15-38	1st Floor – Room 153	Joint compound	NAD
15-39	2nd Floor – Room 200	Joint compound	NAD
16-40	2nd Floor – Room 200	Ceiling tile (2'x2')	NAD
16-41	1st Floor – Room 153	Ceiling tile (2'x2')	NAD
Homogenous Material	**Location on August 23, 2017**	**Material**	**Asbestos Content**
01-01	Room 251 Dark Room	1st Layer 12 x 12 Off White Tiles Glue	NAD
01-02	Room 251 Dark Room	1st Layer 12 x 12 Off White Tiles Glue	NAD
02-03	**Room 251 Dark Room**	**2nd Layer Green Tiles**	**Chrysotile 15.3%**
02-04	**Room 251 Dark Room**	**2nd Layer Green Tiles**	**NA/SP**
03-05	**Room 251 Dark Room**	**Black Mastic Under Green Tiles**	**Chrysotile 8.1%**
03-06	**Room 249**	**Black Mastic Under Green Tiles**	**NA/SP**
04-07	Room 249	Black Cove Base/Glue	NAD
04-08	Room 249	Black Cove Base/Glue	NAD
05-09	Room 249	2nd Layer Carpet	NAD
05-10	Room 249	2nd Layer Carpet	NAD
06-11	Room 249	Glue Under the Carpet	NAD
06-12	Room 249	Glue Under the Carpet	NAD
07-13	**Room 249**	**Brown Tiles Under Carpet/Mastic**	**Chrysotile 9.4%**
07-14	**Room 249**	**Brown Tiles Under Carpet/Mastic**	**NA/SP**

Homogenous Material	Location	Material	Asbestos Content
08-15 (Mastic)	**Room 249**	**Level Compound Mastic**	**Chrysotile 15.9%**
08-15 (Leveling Compound)	**Room 249**	**Level Compound**	**NA/SP**
08-16 (Mastic)	Room 249	Level Compound Mastic	NAD
08-16 (Leveling Compound)	Room 249	Level Compound	NAD
09-17	Room 149.1	12 x 12 Grey Tiles	NAD
09-18	Room 149.2	12 x 12 Grey Tiles	NAD
10-19 (Mastic)	Room 149.2	Level Compound Mastic	NAD
10-19 (Leveling Compound	Room 149.2	Level Compound	NAD
10-20 (Mastic)	Room 149.2	Level Compound Mastic	NAD
10-20 (Leveling Compound)	Room 149.2	Level Compound	NAD
11-21	Room 149.2	2 x 4 Ceiling Tiles	NAD
11-22	Room 149.1	2 x 4 Ceiling Tiles	NAD
12-23	Room 100 – Side Office	Top Layer 12 x 12 Beige Tiles	NAD
12-24	Office Machine	Top Layer 12 x 12 Beige Tiles	NAD
13-25	Office Machine	2nd Layer Tiles/Glue	NAD
13-26	Room 100 Side Office	2nd Layer Tiles/Glue	NAD
14-27	Room 100 Side Office	3rd Layer Tiles/Glue	NAD
14-28	Office Machine	3rd Layer Tiles/Glue	NAD
15-29	Room 100 Main Classroom	12 x 12 Tiles/Mastic	NAD
15-30	Room 100 Main Classroom	12 x 12 Tiles/Mastic	NAD
16-31	Room 254	Duct Insulation Cover	NAD
16-32	Room 252	Duct Insulation Cover	NAD

NAD: NO ASBESTOS DETECTED
NAD-NVD: NO ASBESTOS DETECTED-NO VERMICULITE DETECTED
NA/PS: NOT ANALYZED POSITIVE STOP
BOLD: ASBESTOS-CONTAINING MATERIAL

Samples were collected of all suspect material and sent to ATC Group Services LLC (ATC) located at 104 East 25th Street, New York, NY for analysis. ATC's laboratory is accredited by the New York State Department of Health (ELAP No.10879).

All bulk samples were analyzed by Polarized Light Microscopy (PLM) with dispersion staining as described by the Interim Method of the Determination of Asbestos in Bulk Insulation, Federal Register/Volume 47, No. 103/May 27, 1982. It should be noted that some ACM may not be accurately identified and/or quantified by PLM. As an example, the original fabrication of non-friable organically bound (NOB) materials, such as vinyl floor tile materials, routinely involved milling of asbestos fibers to extremely small sizes. As a result, these fibers may go undetected under the standard PLM method. Under these circumstances, ALAC Analytical lab (ELAP 11605) conducted additional bulk sample analysis via Transmission Electron Microscopy (TEM), which is required under applicable State of New York regulations for a more definitive analysis of NOB materials whenever PLM results are inconclusive.

The results of blue vinyl floor tile (12"x12") and the associated bonding mastic identified in the Basement Coaches' Office tested positive for asbestos content in a material (i.e. greater than 1% asbestos by volume). Approximately 300 square feet of this material is present. If it is determined this material would be disturbed during construction for the future plans or any other activity, it should be abated by a licensed asbestos abatement contractor in accordance with all applicable jurisdictional regulations.
2nd Layer of Green Floor Tiles and Black Mastic under Green Floor Tiles in room 251 – 376SF
Brown Floor Tiles under the Carpet and Leveling Compound Mastic in Room 249 - 580SF

Appendix A contains copy of the laboratory reports and chain-of-custody forms for your records.

3. Inspection for Lead Based Paint

Six paint chip samples were collected representing paint types anticipated to be disturbed during construction activities for the planned. The samples were transported with a laboratory chain-of-custody to Atlas Environmental Laboratories Atlas) at 255 West 36th Street, New York, NY for the analysis of lead content in paint. Atlas is accredited by the New York Department of Health to perform lead in paint analysis under certification No. 11999.

Paint is determined to be "lead based" by the HUD guidelines when its content is tested by laboratory analysis or the results of an on-site x-ray fluorescent analyzer to have a lead concentration greater than 1.0 milligrams per square centimeter (mg/cm^2) or 0.5% lead by weight. A summary of the analytical results is presented in Table 2 below:

Table 2: Results of Paint Chip Analysis for Lead

Sample ID No.	Material Description	Location	Lead Content (% weight)
LBP-1	Blue paint	Bsmt – lower wall level	<0.03
LBP-2	Light blue paint	Bsmt – upper wall level	0.06
LBP-3	Beige paint	2nd Fl – Wrestling Room	<0.03
LBP-4	Off-white paint	2nd Fl – Room 200	<0.03
LBP-5	Yellow paint overlying blue paint	1st Fl – Room 153	<0.03
LBP-6	Yellow paint	1st Fl – Room 152	<0.03

All positive sample are printed in bold-face

Based on the results of the laboratory analysis, none of the samples exceeded the HUD guideline for lead based paint of greater than 0.5% lead by weight. Therefore, the paint represented by the samples is not classified as lead based paint.

4. Conclusions/Recommendations

Asbestos Containing Materials

The results of blue vinyl floor tile (12"x12") and the associated bonding mastic identified in the Basement Coaches' Office tested positive for asbestos content in a material (i.e. greater than 1% asbestos by volume). Approximately 300 square feet of this material is present. If it is determined this material would be disturbed during construction for the future plans or any other activity, it should be abated by a licensed asbestos abatement contractor in accordance with all applicable jurisdictional regulations.

Lead Based Paint

A total of six samples representing paint types anticipated to be disturbed during the future plans for the High School were collected for lead analysis. All of the samples tested negative for lead content and therefore are not classified as lead based paint.

Limitations of the Inspection

Warren & Panzer Engineers, P.C. inspected and conducted limited sampling of materials for asbestos content, which were observable and accessible to the survey team. It is possible, however, that additional suspect ACM may exist within interstitial spaces (i.e. pipe chases, behind walls/ceilings, above fixed ceilings, etc.).

The limited inspection involved materials which may be disturbed during a specific scope of work and does not cover materials outside the scope of work. Any change in the scope of work for the planned project may affect different materials and require another asbestos inspection which would include such materials.

Warren & Panzer Engineers, P.C. conducted limited sampling of suspect Lead Based Paint. The information provided in this report is meant to provide general insight into overall environmental concerns at this building. For any additional renovation projects, specific surveys and sampling will be required in order to confirm the presence/absence of lead paint concerns prior to commencement of extensive building modifications or upgrades.

Report Certifications

Warren & Panzer Engineers, P.C., certifies that the information contained herein is based on the physical and visual inspections conducted by Warren & Panzer Engineers, P.C. and data collected during the inspection survey.

We appreciate the opportunity to be of the service to Port Chester-Rye UFSD**.** Should you have any questions or require additional information, please contact our office.

Sincerely,

Robert J. Treglio
Senior Project Manager

Appendix A

Laboratory Reports & Chain of Custody Forms

ALAC Analytical Labs
522 EAST 20TH STREET, SUITE 6E
NEW YORK, NY 10009
MAILING ADDRESS
TEL: (646) 773-7572 FAX (646) 654-1476
New York State Department of Health Environmental Laboratory
Approval Program ELAP# 11605
Lab address: 1709 Kings Highway, Suite #3, Brooklyn, NY, 11229

BULK SAMPLE ANALYSIS REPORT

CLIENT: Warren & Panzer Engineer's,P.C. **ALAC project: 170712-19**

BUILDING ADDRESS: 1306806

PROJECT#:

Client Samle ID#	HA No.	SAMPLE DESCRIPTION	SAMPLE LOCATION	LAB ID#	ANALYTICAL METHOD	PLM RESULT			Non-Fibros Material Percentage and Type	PLM-NOB RESULT		GRAVIMETRIC			Vermikulite	TEM RESULT ***
						Color	Asbestos Percentage and Type	Other Fiber Material Percentage and Type		Asbestos Percentage and Type	Other Fiber Material Percentage and Type	Organic,%	Non-organic,%	CACO3 %		
1	1	Fiber Glass I Wrap	Bsmt-Custidian Ctr-8"Pipe	170712-19-1	198.1	White Yellow	NAD	90%Fiber Glass	10%						NO	
2	1	Fiber Glass I Wrap	Bsmt-Custidian Ctr-3"Pipe	170712-19-2	198.1	Pinc Tan	NAD	10% Cellulose	90%						NO	
3	1	Fiber Glass I Wrap	Bsmt-NE Entrance to grounds	170712-19-3	198.1	Blue Yellow	NAD	20%Fiber Glass	80%						NO	
4	1	Fiber Glass I Wrap	Bsmt-Boiler Room	170712-19-4	198.1	Grey Brown	NAD	10% Cellulose	90%						NO	
5	2	Mortar	Bsmt-Boiler Room N wall East	170712-19-5	198.1	Brown	NAD		100%						NO	
6	2	Mortar	Bsmt-Boiler Room N wall East	170712-19-6	198.1	Brown	NAD		100%							
7	3	Fiber Glass Duct Insulation Wrap	Boiler Room,Boiler Breach	170712-19-7	198.1	Grey Yellow	NAD	10%Fiber Glass	90%							
8	3	Fiber Glass Duct Insulation Wrap	Boiler Room,Boiler Breach	170712-19-8	198.1	White Brown	NAD	80%Fiber Glass	20%						NO	
9	3	Fiber Glass Duct Insulation Wrap	Boiler Room,Boiler Breach	170712-19-9	198.1	White Yellow	NAD	10%Fiber Glass	90%						NO	

Date Collected: 12-Jul-2017 Date Received: 12-Jul-2017

Date of Analysis: 13-Jul-2017 Date of Report: 13-Jul-2017

Analyst: A. Barengolts
Alex Barengolts

Lab Director: A. Knobel
A.Knobel

* Analysis of samples is performed by Polarized Light Microscopy (PLM) - Point Counting Method (EPA 600/M4-82-020) ,or ELAP-198.1 for NY Friable samples

* Analytical equipments: Stereobinocular microscope (MEIJI -Serial # RM 84203), Polarized Light Microscope (MEIJI -Serial # 14139)

* PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing. NAD or TRACE by PLM are inconclusive.

(**) In accordance with NYS DOH definitive negative results for NOB materials can only be determined by performing Transmission Electron Microscopy (TEM) ELAP Method 198.4

(*) All above mention samples only determined as NOB and must be analized by one of gravimetric matrix reduction methods (198.6 & 198.4) ELAP Item 198.6.2

* Not Applicable = not analyzed positive stop.ELAP PLM Method 198.1 for NY friable samples include the identification and quantitation for vermiculite.

* The results relate only to the items calibrated or tested. NA-Not Applicable NAD-No asbestos Detected

* The certificate of report shall not be reproduced without the written approval of the laboratory.

* The report must not be used by the client to claim endorsement by ELAP or any other agency of the US Government. Samples will be stored for sixty (60) days

NYS-DOH ELAP # 11605

****Recommended 198.8 SOF

*** Performed by ATC NYS DOH ELAP # 10879

ALAC Analytical Labs
522 EAST 20TH STREET, SUITE 6E
NEW YORK, NY 10009
MAILING ADDRESS
TEL: (646) 773-7572 FAX (646) 654-1476
New York State Department of Health Environmental Laboratory
Approval Program ELAP# 11605
Lab address: 1709 Kings Highway, Suite #3, Brooklyn, NY, 11229

BULK SAMPLE ANALYSIS REPORT

CLIENT: Warren & Panzer Engineer's,P.C. **ALAC project: 170712-19**

BUILDING ADDRESS: 1306795

PROJECT#:

Client Samle ID#	HA No.	SAMPLE DESCRIPTION	SAMPLE LOCATION	LAB ID#	ANALYTICAL METHOD	PLM RESULT			Non-Fibros Material Percentage and Type	PLM-NOB RESULT		GRAVIMETRIC			Vermikulite	TEM RESULT ***
						Color	Asbestos Percentage and Type	Other Fiber Material Percentage and Type		Asbestos Percentage and Type	Other Fiber Material Percentage and Type	Organic,%	Non-organic,%	CACO3 %		
10	4	Thremal Duct Insulation	Boiler room Ceiling m.work Duct.	170712-19-10	198.1	Grey	NAD	10%Fiber Glass	90%						NO	
11	4	Thremal Duct Insulation	Boiler room Ceiling m.work Duct.	170712-19-11	198.1	Grey	NAD	15%Fiber Glass	85%						NO	
12	4	Thremal Duct Insulation	Boiler room Ceiling m.work Duct.	170712-19-12	198.1	Grey	NAD	10%Fiber Glass	90%						NO	
13	5	Brick Mortar	Exterior N Wall	170712-19-13	198.1	Grey	NAD		100%						NO	
14	5	Brick Mortar	Exterior N Wall	170712-19-14	198.1	Grey	NAD		100%						NO	
15	6	Window Caulking	Exterior N Windows-East	170712-19-15	198.6	Black				Inconclusive NAD		50.67	6.87	42.46	NO	NAD
16	6	Window Caulking	Exterior N Windows-West	170712-19-16	198.6	Black				Inconclusive NAD		51.88	4.66	43.46	NO	NAD
21	9	Ceramic wall Tile Grout	Bsmt - South Locker rm	170712-19-17	198.1	White Blue	NAD		100%						NO	
22	9	Ceramic wall Tile Grout	Bsmt -NE Boys Locker rm	170712-19-18	198.1	White Blue	NAD		100%						NO	

Date Collected: 12-Jul-2017 Date Received: 12-Jul-2017

Date of Analysis: 13-Jul-2017 Date of Report: 13-Jul-2017

Analyst: A. Barengolts

Alex Barengolts

Lab Director: A. Knobel

A.Knobel

* Analysis of samples is performed by Polarized Light Microscopy (PLM) - Point Counting Method (EPA 600/M4-82-020) ,or ELAP-198.1 for NY Friable samples

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NYS-DOH ELAP # 11605

****Recommended 198.8 SOF

*** Performed by ATC NYS DOH ELAP # 10879

Samples will be stored for sixty (60) days

ALAC Analytical Labs
522 EAST 20TH STREET, SUITE 6E
NEW YORK, NY 10009
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New York State Department of Health Environmental Laboratory
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BULK SAMPLE ANALYSIS REPORT

ALAC project: 170712-19

CLIENT: Warren & Panzer Engineer's,P.C.

BUILDING ADDRESS: 1306795

PROJECT#:

Client Samle ID#	HA No.	SAMPLE DESCRIPTION	SAMPLE LOCATION	LAB ID#	ANALYTICAL METHOD	PLM RESULT			Non-Fibros Material Percentage and Type	PLM-NOB RESULT		GRAVIMETRIC			Vermikulite	TEM RESULT ***
						Color	Asbestos Percentage and Type	Other Fiber Material Percentage and Type		Asbestos Percentage and Type	Other Fiber Material Percentage and Type	Organic,%	Non-organic,%	CACO3 %		
23	10	Ceramic Floor Tile Grout	Bsmt -NE Boys Locker rm shouer	170712-19-19	198.1	Off White	NAD		100%						NO	
24	10	Ceramic Floor Tile Grout	Bsmt - South Locker rm	170712-19-20	198.1	Off White	NAD		100%						NO	
25	11	Wall/Ceiling Plaster(Wh+Br)Composite	Bsmt - Coach's Office	170712-19-21	198.1	White	NAD		100%						NO	
26	11	Wall/Ceiling Plaster(Wh+Br)Composite	Bsmt - South Locker rm	170712-19-22	198.1	White	NAD		100%						NO	
27	11	Wall/Ceiling Plaster(Wh+Br)Composite	Bsmt -NE Boys Locker rm shouer	170712-19-23	198.1	White	NAD		100%						NO	
28	11	Wall/Ceiling Plaster(Wh+Br)Composite	Bsmt -NE Out door entrance by rm B116	170712-19-24	198.1	White	NAD		100%						NO	
29	11	Wall/Ceiling Plaster(Wh+Br)Composite	2nd floor Wrestling rm	170712-19-25	198.1	White	NAD		100%						NO	
30	11	Wall/Ceiling Plaster(Wh+Br)Composite	1st floor rm 152	170712-19-26	198.1	White	NAD		100%						NO	
31	11	Wall/Ceiling Plaster(Wh+Br)Composite	2nd floor rm 200	170712-19-27	198.1	White	NAD		100%						NO	

Date Collected: 12-Jul-2017
Date of Analysis: 13-Jul-2017

Date Received: 12-Jul-2017
Date of Report: 13-Jul-2017

Analyst: A. Barengolts
Alex Barengolts

Lab Director: A. Knobel
A.Knobel

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* Analytical equipments: Stereobinocular microscope (MEIJI -Serial # RM 84203), Polarized Light Microscope (MEIJI -Serial # 14139)
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NYS-DOH ELAP # 11605

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*** Performed by ATC NYS DOH ELAP # 10879
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BULK SAMPLE ANALYSIS REPORT

ALAC project: 170712-19

CLIENT: Warren & Panzer Engineer's,P.C.

BUILDING ADDRESS: 1306795

PROJECT#:

Client Samle ID#	HA No.	SAMPLE DESCRIPTION	SAMPLE LOCATION	LAB ID#	ANALYTICAL METHOD	PLM RESULT			Non-Fibros Material Percentage and Type	PLM-NOB RESULT		GRAVIMETRIC			Vermikulite	TEM RESULT ***
						Color	Asbestos Percentage and Type	Other Fiber Material Percentage and Type		Asbestos Percentage and Type	Other Fiber Material Percentage and Type	Organic,%	Non-organic,%	CACO3 %		
34	13	Drywall	2nd floor Wrestling rm	170712-19-28	198.1	Grey Brown	NAD	15% Cellulose 1%Fiber Glass	84%						NO	
35	13	Drywall	1st floor rm 153	170712-19-29	198.1	Grey Brown	NAD	10% Cellulose 1%Fiber Glass	89%						NO	
38	15	Joint Compound	1st floor rm 153	170712-19-30	198.1	White	NAD		100%						NO	
39	15	Joint Compound	2nd floor rm 200	170712-19-31	198.1	White	NAD		100%						NO	

Date Collected: 12-Jul-2017
Date of Analysis: 13-Jul-2017

Date Received: 12-Jul-2017
Date of Report: 13-Jul-2017

Analyst: A. Barengolts
Alex Barengolts

Lab Director: A. Knobel
A.Knobel

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* PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing. NAD or TRACE by PLM are inconclusive.
(**) In accordance with NYS DOH definitive negative results for NOB materials can only be determined by performing Transmission Electron Microscopy (TEM) ELAP Method 198.4
(*) All above mention samples only determined as NOB and must be analized by one of gravimetric matrix reduction methods (198.6 & 198.4) ELAP Item 198.6.2
* Not Applicable = not analyzed positive stop.ELAP PLM Method 198.1 for NY friable samples include the identification and quantitation for vermiculite.
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****Recommended 198.8 SOF

*** Performed by ATC NYS DOH ELAP # 10879

Samples will be stored for sixty (60) days

NYS-DOH ELAP # 11605

1306795

WARREN & PANZER ENGINEER'S, P.C.
228 East 45th Street, 2nd floor
New York, NY 10017
Phone: (212) 922-0077
Fax: (212) 922-0630

Project Manager R. Treglio
wplabreports@warrenpanzer.com

Client Name: _____
Location _____ _____
W&P file _____ _____

- ■ PLM –EPA 600/M4/82/020
- ■ PLM NOB –NYS 198.1/198.6
- ■ TEM NOB –NYS 198.4
- ☐ Lead Paint Chip –SW-846-3050B

170712-19

BULK SAMPLE – CHAIN-OF-CUSTODY FORM

COMMENTS:

Turn around time: RUSH 24hr 48hr+

Sent to TEM	Lab I.D. # (Lab use only)	Sample #	Location	Material Description	RESULTS (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
		01-01	Bsmt-Custodian Ctr-8" Pipe	Fiberglas PI Wrap				
		02	Bsmt-Custodian Ctr-3" Pipe	↓				
		03	Bsmt-NE entrance to grounds	↓				
		04	Bsmt-Boiler Room	↓				
		02-05	Bsmt Boiler Rm, N. wall-east	CMU Mortar				
		06	Bsmt Boiler Rm, N. wall-west	↓				
		03-07	Boiler Rm, Boiler Breach	Fiberglass Duct Insulation Wrap				
		08	↓	↓				
		09	↓	↓				
		04-10	Boiler Rm, Ceiling mounted Duct Work	Thermal Duct Insulation				
		11	↓	↓				
		12	↓	↓				
		05-13	Exterior N. wall	Brick Mortar				
		14	↓	↓				
	✓	06-15	Exterior N. windows-east	Window Caulk				

Sampled By: R. Treglio	Date: 7/10/17	Analyzed By:	Date:
Signature:		Signature:	Time:
Relinquished By: R. Treglio	Date: 7/11/17	Analyzed By:	Date:
Signature:		Signature: ALAC	Time:
Received By:	Date: 7/11/17	Received By: AK	Date: JUL 12 2017
Signature:	Time:	Signature: BY HAND	Time: 1630
Analyzed By:	Date: 7/13/17	Analyzed By:	Date:
Signature:	Time:	Signature:	Time:

1306795

Page 2 of 3

WARREN & PANZER ENGINEER'S, P.C.

228 East 45th Street, 2nd floor
New York, NY 10017

Phone: (212) 922-0077
Fax: (212) 922-0630

Project Manager R. Treglio
wplabreports@warrenpanzer.com

Client Name

Location

W&P file:

- ■ PLM –EPA 600/M4/82/020
- ■ PLM NOB –NYS 198.1/198.6
- ■ TEM NOB –NYS 198.4
- □ Lead Paint Chip –SW-846-3050B

170712-19

BULK SAMPLE – CHAIN-OF-CUSTODY FORM

COMMENTS:

Turn around time: RUSH 24hr 48hr+

Sent to TEM	Lab I.D. # (Lab use only)	Sample #	Location	Material Description	RESULTS (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
		06- 16	Exterior N. Windows - west	Window Caulk				
		07- 17	Bsmt - Coach's Office	FT (12"x12" - blue)/mastic composite.				
		18	↓	↓				
		08- 19	Bsmt - NE Boys Locker Rm	Cove base (black)/glue composite.				
		20	Bsmt - Coach's Office	↓				
		09- 21	Bsmt - SW/SE/NW/NE South Locker Rm	Ceramic wall tile grout				
		22	Bsmt - NE Boys Locker Rm	↓				
		10- 23	Bsmt - NE Boys Locker Rm Shower	Ceramic floor tile grout				
		24	Bsmt - South Locker Rm	↓				
		11- 25	Bsmt - Coach's Office	wall/ceiling Plaster (wh+br) composite				
		26	Bsmt - South Locker Rm	↓				
		27	Bsmt - NE Boys Locker Rm	↓				
		28	Bsmt - NE Outdoor entrance by Rm B116	↓				
		29	2nd Fl - Wrestling Rm	↓				
		30	1st Fl - Rm 152	↓				

Sampled By: R. Treglio	Date: 7/10/17	Analyzed By:	Date:
Signature:		Signature:	Time:
Relinquished By: R. Treglio	Date: 7/11/17	Analyzed By:	Date:
Signature:		Signature:	Time:
Received By:	Date: 7/11/17	Received By: ALAC	Date: JUL 12 2017
Signature:	Time:	Signature:	Time: 1630
Analyzed By:	Date: 7/11/17	Analyzed By:	Date:
Signature:	Time: 7/13/17	Signature:	Time:

BY HAND

1806795

WARREN & PANZER ENGINEER'S, P.C.
228 East 45th Street, 2nd floor
New York, NY 10017
Phone: (212) 922-0077
Fax: (212) 922-0630

Project Manager R. Treglio
wplabreports@warrenpanzer.com

Client Name: _____
Location _____
W&P file: _____

- ■ PLM –EPA 600/M4/82/020
- ■ PLM NOB –NYS 198.1/198.6
- ■ TEM NOB –NYS 198.4
- □ Lead Paint Chip –SW-846-3050B

170712-19

BULK SAMPLE – CHAIN-OF-CUSTODY FORM

Turn around time: RUSH 24hr 48hr+

COMMENTS:

Sent to TEM	Lab I.D. # (Lab use only)	Sample #	Location	Material Description	RESULTS (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
		11-31	2nd Fl - Rm 200	wall/ceiling plaster (wh+br) composite				
		12-32	Bsmt - Coaches' Bathroom	ceiling tile (2'x4')				
		33	Bsmt NE Boys Locker Rm	↓				
		13-34	2nd Fl - Wrestling Rm	Dry Wall				
		35	1st Fl - Rm 153	↓				
		14-36	1st Fl - Rm 153	FT (12"x12" - beige & gy in checker pattern)				
		37	2nd Fl - Rm 200	/ mastic composite				
		15-38	1st Fl - Rm 153	Joint Compound				
		39	2nd Fl - Rm 200	↓				
		16-40	2nd Fl - Rm 200	ceiling tile (2'x2')				
		41	1st Fl - Rm 153	↓				

Sampled By: R. Treglio	Date: 7/10/17	Analyzed By:	Date:
Signature:		Signature:	Time:
Relinquished By: R. Treglio	Date: 7/11/17	Analyzed By:	Date:
Signature:		Signature: ALAC	Time:
Received By:	Date: 7/11/17	Received By: AB	Date: JUL 12 2017
Signature:	Time:	Signature: BY HAND	Time: 1630
Analyzed By:	Date: 7.13.17	Analyzed By:	Date:
Signature: HB	Time:	Signature:	Time:

ATC Group Services LLC

104 E. 25th Street, 8th Floor
New York, NY 10010
Tel. 212-353-8280
Fax: 212-353-8306

Client: ABASBESTOS Corp.
1709 Kings Highway, Suite #3
Brooklyn, NY 11229
Fax: (646) 875-4133 **Phone:** (718) 864-3666
Project : WKP AB-311
1306795
Location: 065.01.62

Date Sampled :
Date Received : 7/12/2017 10:05:00 AM
Date Analyzed : 7/12/17
ATC Batch #: 95475
Total Samples: 10

Asbestos Bulk Analysis Results by Transmission Electron Microscopy (TEM)
Method ELAP 198.4

Sample	*HG Area*	*Insoluble Non Asbestos Inorganic %*	*Asb % By PLM*	*Asbestos Type(s) By PLM*	*Asb % By TEM*	*Asbestos Type(s) By TEM*	*Total % Asbestos By TEM*
07-17 *95475 -1*		13.38			2.00	CHRYSOTILE	2.007
07-18 *95475 -2*		15.66				Not Analyzed	
08-19 *95475 -3*		21.86			0	None Detected	NAD
08-20 *95475 -4*		5.47			0.16	CHRYSOTILE	<1
12-32 *95475 -5*		33.14			0	None Detected	NAD
12-33 *95475 -6*		6.53			0	None Detected	NAD
14-36 *95475 -7*		12.74			0	None Detected	NAD
14-37 *95475 -8*		10.41			0	None Detected	NAD
16-40 *95475 -9*		10.43			0	None Detected	NAD
16-41 *95475 -10*		1.09			0	None Detected	NAD

ATC Group Services LLC

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New York, NY 10010
Tel. 212-353-8280
Fax: 212-353-8306

Asbestos Bulk Analysis Results by Transmission Electron Microscopy (TEM)
Method ELAP 198.4

Sample	HG Area	Insoluble Non Asbestos Inorganic %	Asb % By PLM	Asbestos Type(s) By PLM	Asb % By TEM	Asbestos Type(s) By TEM	Total % Asbestos By TEM

NOTES:

1) Disclaimer: The laboratory is not responsible for sample collection. The laboratory is not responsible for any procedures not performed by the laboratory. This report cannot be reproduced without written approval by ATC Group Services LLC. This report may not be used to claim product endorsement by NVLAP, ELAP or any other agency of the U.S. Government. This report relates only to the samples reported above.
2) Accredited for NVLAP #101187 and ELAP #10879
3) Confidentiality Notice:
The document(s) contained herein are confidential and privileged information, intended for the exclusive use of the individual or entity named above.
4) Liability Notice:
ATC Group Services LLC and its personnel shall not be liable for any misinformation provided to us by the client regarding these samples. This report relates only to samples submitted and analyzed.
5) Unless otherwise indicated, no blank corrections were performed.
6) The data withing this report is reliable to 2 significant figures.
7) The condition of all samples was acceptable upon receipt.
8) Unless otherwise indicated all QC results were in control.
9) The laboratory certifies that the test results meet all requirements of NELAC.
10) Supplement to test report batch # _____. Amendments: ____. Amendment Dates: _____. Amended by: _____
11) ATC Group Services LLC certifies that this report is an accurate and authentic report of results obtained from the laboratory analysis.
12) The uncertainty for these test results is available upon request.

ALEKS BARENGOLTS
Analyzed by:

Roman Peysakhov
Approved by
Quality Manager:

WKP LABORATORIES, INC.
228 E45th St, 2nd Floor
New York, NY 10017
Phone: (212) 922 - 0689
Fax: (212) 922 - 0630

Client Name: WKP AB-311
Send Results To:
Project ID: 1306795
Project Location: 065.01.62
#95475

Analysis Requsted: ○ -PLM (NYS DOH ELAP 198.1/198.6) ◉ -TEM (NYS DOH ELAP 198.4)

Turn Around Time Requested: ◉ -RUSH ** ○ -48 Hour ○ -24 Hour ○ -72 Hour

THIS SECTION FOR LABORATORY USE ONLY

BATCH ID : _____

Received by: _____ Signature _____ Date _____ Time

Processed by: _____ Signature _____ Date _____ Time

Prepped by: _____ Signature _____ Date _____ Time

Prepped by: _____ Signature _____ Date _____ Time

Analyzed by: _____ Signature _____ Date _____ Time

Entered by: _____ Signature _____ Date _____ Time

Approved by: _____ Signature _____ Date _____ Time

Reported by: _____ Signature _____ Date _____ Time

Controlled Document - Bulk Sample COC - R4.0 - 6/6/2013

THIS SECTION FOR LABORATORY USE ONLY

BULK SAMPLE - CHAIN OF CUSTODY FORM

Sample ID	Sample Location	Material Description
07 - 17		FT (12x12) Mastic Comp. ↓
18		
08 - 19		Cove base / Glue composite ↓
20		
12 - 32		Ceiling Tile (2x4) ↓
33		
14 - 36		FT (12x12) Mastic Comp. ↓
37		
16 - 40		Ceiling Tile (2x4) ↓
41		

Sampled by: QC9 _____ Signature _____ 7/11/17 Date _____ Time

Relinquished by: AC _____ Signature _____ 7/12/17 Date 10:05 Time

Received by: _____ Signature _____ Date _____ Time

Relinquished by: _____ Signature _____ Date _____ Time

** - RUSH turn around is dependant upon sample type, number of samples, analysis requested and laboratory capacity. Contact WKP for information.

pg 1 of 31

1st + 3rop

Atlas Environmental Lab, Corp
255 W 36th Street Suite 1503
New York, NY 10018
Phone:(212) 563-0400 Fax:(718) 563-0401
www.atlasenvironmentallab.com

REPORT OF ANALYSIS FOR LEAD PAINT

Client: Warren & Panzer Engineer's P.C., 288 E 45th St, 2nd Fl, NY, NY 10017
Collected By: Client
Project Name/No.: 065.01.62
Project Address: Westchester County, NY
Work Area:

Report No: LP0717054
Date Sampled: 7/10/2017
Date Received: 7/12/2017
Date Analyzed: 7/12/2017
Report Date: 7/13/2017

Client ID #	Lab ID #	Location/Description	Result (% Pb W/W)
LBP-1	LP0717054-1	Basement - Lower Wall Level - Blue Paint	<0.03
LBP-2	LP0717054-2	Basement - Upper Wall Level - Light Blue Paint	0.06
LBP-3	LP0717054-3	2nd Floor - Wrestling Room - Beige Paint	<0.03
LBP-4	LP0717054-4	2nd Floor - Classroom 200 - Off-White Paint	<0.03
LBP-5	LP0717054-5	1st Floor - Classroom 153 - Yellow Paint w/ Underlying Blue	<0.03
LBP-6	LP0717054-6	1st Floor - Classroom 152 - Yellow Paint	<0.03

Analysis Method: EPA 7000B Prep Method: EPA 3050B
RL (Reporting limit): 0.03% by weights (based upon 100 mg sampled)

NYSDOH-ELAP# 11999 , AIHA ID:208306

Analyst: RP Approved by:

Collection procedure, protocols and sample locations are based on information provided by the client submitting the samples;
and as such, Atlas Environmental Labs disclaims any knowledge of and liability for the accuracy and completeness of this information.
The results related only to the items tested. Lead results are not corrected for blank.

LBP 17057

Atlas Environmental Lab, Corp
255 West 36th Street, Suite# 1503
New York, NY 10018
Phone:(212) 563-0400 Fax:(212) 563-0401

CHAIN OF CUSTODY
LEAD ANALYSIS

Client Warren Panzer Engineers **Contact Name** R. Treglio **Project Name & No.** 065.01.62
Address 228 E. 45th St. 2nd Fl **Phone Number** _____ **Project Location** _____
New York, NY 10017 **Email** rtreglio@warrenpanzer.com **Work Area** Westchester Co., NY

Matrix: ☐ Wipes ☒ Paint by weight ☐ Paint by area ☐ Soil

Turn Around Time: ☐ 24 Hrs. ☐ 48 Hrs. ☒ 72 Hrs.

Field ID	AEL Lab ID	Location/Description	Area (ft^2) (If require)
LBP-1		Bsmt-Lower wall level / Blue Paint	< 0.03
2		Bsmt-Upper Wall level / Light Blue Paint	0.06
3		2nd Fl-Wrestling Rm / Beige Paint	< 0.03
4		2nd Fl-Class Room 200 (Off-white paint)	< 0.03
5		1st Fl-Class Room 153 / Yellow paint w/underlying blue	< 0.03
6		1st Fl-Class Room 152 / Yellow Paint	< 0.03

Sampled By: O. Whitehead	Signature:	Date: 7/10/2017	Time:
Received By:	Signature:	Date: 7/12/17	Time: 9:40am
Relinquished By:	Signature:	Date:	Time:
Received By:	Signature:	Date:	Time:
Analyst: R. Figueroa	Signature:	Date: 7/12/17	Time:

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
WKP Log I.D. #:	1307031	DATE RECEIVED:	08/24/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/24/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
01-01	1307031-001	1st Layer 12"x12" Off-White Tiles/Glue, Room 251 - Dark Room, Non-Fibrous, Beige/Black/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
01-02	1307031-002	1st Layer 12"x12" Off-White Tiles/Glue, Room 251 - Dark Room, Non-Fibrous, Beige/Black/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
02-03	1307031-003	2nd Layer Green Tiles, Room 251 - Dark Room, Non-Fibrous, Green, Homogeneous	Chrysotile	15.3%			Non-Fibrous Material	84.7%
			Total % Asbestos:	15.3%				
02-04	1307031-004	2nd Layer Green Tiles, Room 251 - Dark Room, Non-Fibrous, Green, Homogeneous Note: Positive Stop / Not Analyzed						
			Total % Asbestos:	Not Analyzed				
03-05	1307031-005	Black Mastic Under Green Tiles, Room 251 - Dark Room, Non-Fibrous, Black, Homogeneous	Chrysotile	8.1%			Non-Fibrous Material	91.9%
			Total % Asbestos:	8.1%				
03-06	1307031-006	Black Mastic Under Green Tiles, Room 251 - Dark Room, Non-Fibrous, Black, Homogeneous Note: Positive Stop / Not Analyzed						
			Total % Asbestos:	Not Analyzed				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
WKP Log I.D. #:	1307031	DATE RECEIVED:	08/24/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/24/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
04-07	1307031-007	Black Cove Base/Glue, Room 249, Non-Fibrous, Black/White, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
04-08	1307031-008	Black Cove Base/Glue, Room 249, Non-Fibrous, Black/White, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
05-09	1307031-009	2nd Layer Carpet, Room 249, Fibrous, Green/Brown, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
05-10	1307031-010	2nd Layer Carpet, Room 249, Fibrous, Green/Brown, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
06-11	1307031-011	Glue Under the Carpet, Room 249, Non-Fibrous, Yellow, Homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
06-12	1307031-012	Glue Under the Carpet, Room 249, Non-Fibrous, Yellow, Homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
WKP Log I.D. #:	1307031	DATE RECEIVED:	08/24/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/24/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
07-13	1307031-013	Brown Tiles Under Carpet/Mastic, Room 249, Non-Fibrous, Dark Red/Black, Non-homogeneous	Chrysotile	9.4%			Non-Fibrous Material	90.6%
			Total % Asbestos:	9.4%				
07-14	1307031-014	Brown Tiles Under Carpet/Mastic, Room 249, Non-Fibrous, Dark Red/Black, Non-homogeneous Note: Positive Stop / Not Analyzed						
			Total % Asbestos:	Not Analyzed				
08-15 Mastic	1307031-015	Level Compound Mastic, Room 249, Non-Fibrous, Black/Gray, Non-homogeneous	Chrysotile	15.9%			Non-Fibrous Material	84.1%
			Total % Asbestos:	15.9%				
08-15 Leveling Compound	1307031-016	Level Compound, Room 249, Non-Fibrous, Gray, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
08-16 Mastic	1307031-017	Level Compound Mastic, Room 249, Non-Fibrous, Black/Gray, Non-homogeneous Note: Positive Stop / Not Analyzed						
			Total % Asbestos:	Not Analyzed				
08-16 Leveling Compound	1307031-018	Level Compound, Room 249, Non-Fibrous, Gray, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
09-17	1307031-019	12"x12" Gray Tiles, Room 149.1, Non-Fibrous, Light Gray/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
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BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

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New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
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Attention:	Greg Chomenko	ANALYSIS DATE:	08/24/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
09-18	1307031-020	12"x12" Gray Tiles, Room 149.2, Non-Fibrous, Light Gray/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
10-19 Mastic	1307031-021	Level Compound Mastic, Room 149.2, Non-Fibrous, Black/Gray, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
10-19 Leveling Compound	1307031-022	Level Compound, Room 149.2, Non-Fibrous, Beige, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
10-20 Mastic	1307031-023	Level Compound Mastic, Room 149.2, Non-Fibrous, Black/Gray, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
10-20 Leveling Compound	1307031-024	Level Compound, Room 149.2, Non-Fibrous, Beige, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
11-21	1307031-025	2'x4' Ceiling Tiles, Room 149.2, Fibrous, White/Gray, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
WKP Log I.D. #:	1307031	DATE RECEIVED:	08/24/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/24/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
11-22	1307031-026	2'x4' Ceiling Tiles, Room 149.1, Fibrous, White/Gray, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
12-23	1307031-027	Top Layer 12"x12" Beige Tiles, Room 100 - Side Office, Non-Fibrous, Beige/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
12-24	1307031-028	Top Layer 12"x12" Beige Tiles, Office Machine, Non-Fibrous, Beige/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
13-25	1307031-029	2nd Layer Tiles/Glue, Office Machine, Non-Fibrous, Beige/Brown, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
13-26	1307031-030	2nd Layer Tiles/Glue, Room 100 - Side Office, Non-Fibrous, Beige/Brown, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
14-27	1307031-031	3rd Layer Tiles/Glue, Room 100 - Side Office, Non-Fibrous, Beige/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/23/2017
WKP Log I.D. #:	1307031	DATE RECEIVED:	08/24/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/25/2017
		REPORT DATE:	08/25/2017
Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, N Y/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
14-28	1307031-032	3rd Layer Tiles/Glue, Office Machine, Non-Fibrous, Beige/Yellow, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
15-29	1307031-033	12"x12 Tiles/Mastic, Room 100 - Main Classroom, Non-Fibrous, Light Gray/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
15-30	1307031-034	12"x12 Tiles/Mastic, Room 100 - Main Classroom, Non-Fibrous, Light Gray/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
16-31	1307031-035	Duct Insulation Cover, Room 254, Fibrous, Silver/Yellow/Brown, Non-homogeneous	None Detected		Fibrous Glass Cellulose Fiber	20% 40%	Non-Fibrous Material	40%
			Total % Asbestos:	No Asbestos Detected				
16-32	1307031-036	Duct Insulation Cover, Room 252, Fibrous, Silver/Yellow/Brown, Non-homogeneous	None Detected		Fibrous Glass Cellulose Fiber	20% 40%	Non-Fibrous Material	40%
			Total % Asbestos:	No Asbestos Detected				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

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Attention:	Greg Chomenko	ANALYSIS DATE:	08/25/2017
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Client Job:	065.01.62	REVISED:	
Charge Code:	065.01.62		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester, NY/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)

ANALYSIS / ACCREDITATIONS: Bulk sample analysis by Polarized Light Microscopy, ELAP Method 198.1 and 198.6. NYS ELAP Laboratory ID # 12012 and NVLAP Lab Code 101950-0.

NOTES:

1. NAD denotes NO ASBESTOS DETECTED.
2. Percentages are calculated using the EPA equivalent Stratified Point-Count Method.
3. The samples in this report were not collected by WKP Laboratories, Inc.
4. This report relates only to the samples tested. It may not be used by the client to claim project endorsement by NVLAP, or any other agency of the U.S. government. The report, or certificate, shall not be reproduced, except in full, without the written approval of the laboratory.
5. All inhomogeneous layers of the bulk sample are analyzed separately.
6. PLM bulk samples will be disposed of after 3 months unless otherwise directed by client in writing.
7. * Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.
8. Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.
9. NY ELAP Item 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite.

Sean Scales
Laboratory Analyst

Sean Scales
Laboratory Director

Report Prepared by:
Sean Scales

warrenpanzer environmental engineering
228 East 45th Street, 2nd Floor
New York, New York 10017
T: 212.922.0077|F: 212.922.0630
E: wplabreports@warrenpanzer.com

CLIENT NAME: Port Chester School District
PROPERTY ADDRESS: 1 Tamarack Rd. Port Chester
SURVEY LOCATION: High School
WP PROJECT #: 065.01.62

☑ PLM-EPA 600/M4/82/020
☑ PLM NOB-NYS 198.1/198.6
☐ TEM NOB - NYS 198.4

1307031

BULK SAMPLE - CHAIN-OF-CUSTODY FORM

COMMENTS:

Turnaround Time: RUSH (24 HR) 48 HR

QTY	Condition	Sample #		Location	Material Description	Results (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
180sq/ft	Fair.	01	01	RM 251, Dark Room,	1st layer 12x12 off-white tiles				
		↓	02	↓	↓ glue				
376sq/ft	↓	02	03	↓	2nd layer green tiles.				
↓	↓	↓	04	↓	↓				
↓	↓	03	05	↓	black mastic under green tiles				
↓	↓	↓	06	↓	↓				
↓	↓	04	07	RM 249	black cove base/glue				
↓	↓	↓	08	↓	↓				
580sq/ft	Poor	05	09	↓	2nd layer carpet/tiles				
↓	↓	↓	10	↓	↓				
↓	↓	06	11	↓	glue under the carpet				
↓	↓	↓	12	↓	↓				
↓	↓	07	13	↓	Brown tiles under carpet/mastic				
↓	↓	↓	14	↓	↓				
↓	↓	08	15	↓	Level compound.				

Sampled by: A. Rebecca
Signature:

Date: 08/23/17
Time: 15:00

Received by: Sean J Scales
Signature:

Date: 08/24/17
Time: 3:00PM

Relinquished by: A. Rebecca
Signature

Date: 08/23/17
Time:

Analyzed by: Sean J Scales
Signature:

Date: 08/24/17
Time: 11:30 PM

warrenpanzer
environmental engineering
228 East 45th Street, 2nd Floor
New York, New York 10017
T: 212.922.0077 | F: 212.922.0630
E: wplabreports@warrenpanzer.com

CLIENT NAME: Port Chester School District
PROPERTY ADDRESS: 1 Tamarack Rd. Port Chester
SURVEY LOCATION: High School
WP PROJECT #: 065.01.62

☑ PLM-EPA 600/M4/82/020
☑ PLM NOB-NYS 198.1/198.6
☑ TEM NOB - NYS 198.4

1307031

BULK SAMPLE - CHAIN-OF-CUSTODY FORM

COMMENTS:

Turnaround Time: RUSH (24 HR) 48 HR

QTY	Condition	Sample #		Location	Material Description	Results (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
		08	-16	rm 249	level compound				
250sqft	Poor.	09	-17	rm 149.1	12x12 grey tiles				
		↓	-18	rm 149.2.	↓				
		10	-19	↓	level compound.				
		↓	-20	↓	↓				
		11	-21	↓	2x4 ceiling tiles.				
	↓	↓	-22	rm 149.1	↓				
260sqft	Fair	12	-23	rm 100, side office	Top layer 12x12 beige tiles				
		↓	-24	office Medline.	↓				
		13	-25	↓	2nd layer tiles/glue.				
		↓	-26	rm 100, side office.	↓				
		14	-27	↓	3rd layer tiles/glue.				
		↓	-28	office Medline.	↓				
932sqft		15	-29	rm 100, main classroom	12x12 tiles/mastic				
↓		↓	-30	↓	↓				

Sampled by: A. Rebuso
Signature: A. Rebuso

Date: 08/23/17
Time: 15:00

Relinquished by: A. Rebuso
Signature: A. Rebuso

Date: 08/24/17
Time:

Received by: Sean J Scales
Signature: Sean J Scales

Date: 08/24/17
Time: 3:00 PM

Analyzed by: Sean J Scales
Signature: Sean J Scales

Date: 08/24/17
Time: 11:30 PM

warrenpanzer
environmental engineering
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T: 212.922.0077 | F: 212.922.0630
E: wplabreports@warrenpanzer.com

CLIENT NAME: Port Chester School District
PROPERTY ADDRESS: 1 Tamarack Rd. Port Chester
SURVEY LOCATION: High School
WP PROJECT #: 065.01.62

☑ PLM-EPA 600/M4/82/020
☐ PLM NOB-NYS 198.1/198.6
☐ TEM NOB - NYS 198.4

1307031

BULK SAMPLE - CHAIN-OF-CUSTODY FORM

COMMENTS:

Turnaround Time: RUSH (24 HR) 48 HR

QTY	Condition	Sample #		Location	Material Description	Results (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
	Fair.	16	-31	rm 254	duct insulation cover				
		↓	-32	rm 252	↓				
			-33						
			-34						
			-35						
			-36						
			-37						
			-38						
			-39						
			-40						
			-41						
			-42						
			-43						
			-44						
			-45						

Sampled by: D. Rekasov
Signature:

Date: 08/23/17
Time: 15:00.

Received by: Sean J Scales
Signature:

Date: 08/24/17
Time: 3:00 PM

Relinquished by: D. Rekasov
Signature

Date: 08/24/17
Time:

Analyzed by: Sean J Scales
Signature:

Date: 08/24/17
Time: 11:30 PM

WKP
LABORATORIES, INC.

Asbestos Analysis of Bulk Material

Test Method: TEM NYS 198.4 NOB

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

		TAT:	24 HR
CLIENT:	Warren & Panzer Engineer's P.C.	DATE COLLECTED:	8/23/2017
WKP LOG I.D.	1307031	RECEIVED DATE:	8/24/2017
ATTENTION:	Greg Chomenko	ANALYSIS DATE:	8/27/2017
CLIENT JOB:	065.01.62	REPORT DATE:	8/30/2017
LOCATION:	Port Chester School District/ 1 Tamarack Road/ Port Chester, NY/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF ANALYSIS BULK MATERIALS

WKP Lab ID	Client Sample #	Location/Description	Asbestos Type(s)
1307031-01	01-01	1st Layer 12"x12" Off-White Tiles/Glue, Room 251 - Dark Room	**NAD**
1307031-02	01-02	1st Layer 12"x12" Off-White Tiles/Glue, Room 251 - Dark Room	**NAD**
1307031-07	04-07	Black Cove Base/Glue, Room 249	**NAD**
1307031-08	04-08	Black Cove Base/Glue, Room 249	**NAD**
1307031-09	05-09	2nd Layer Carpet, Room 249	**NAD**
1307031-10	05-10	2nd Layer Carpet, Room 249	**NAD**
1307031-11	06-11	Glue Under the Carpet, Room 249	**NAD**
1307031-12	06-12	Glue Under the Carpet, Room 249	**NAD**
1307031-19	09-17	12"x12" Gray Tiles, Room 149.1	**NAD**
1307031-20	09-18	12"x12" Gray Tiles, Room 149.2	**NAD**

Accreditations #s: This report contains data that was produced under subcontract by ALAC, NYS-ELAP# 11605 (via ATC, NYS-ELAP# 10879).

NOTES:
NAD denotes- NO ASBESTOS DETECTED / Inconclusive. N/A - Not Analyzed.
The samples in this report were not collected by WKP Laboratories, Inc. Therefore bears no responsibility for sample collection activities or analytical method limitations
This report relates only to the samples tested. It may not be used by the client to claim project endorsement by NVLAP, or any other agency of the U.S. government.
The report, or certificate, shall not be reproduced, except in full, without the written approval of the laboratory
All non-homogeneous layers of the bulk sample are analyzed separately.
PLM bulk samples will be disposed of after 3 months unless otherwise directed by client in writing.
* Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing
Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.

Sean Scales
Laboratory Director

WKP
LABORATORIES, INC.

Asbestos Analysis of Bulk Material

Test Method: TEM NYS 198.4 NOB

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
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		TAT:	24 HR
CLIENT:	Warren & Panzer Engineer's P.C.	DATE COLLECTED:	8/23/2017
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CLIENT JOB:	065.01.62	REPORT DATE:	8/30/2017
LOCATION:	Port Chester School District/ 1 Tamarack Road/ Port Chester, NY/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF ANALYSIS BULK MATERIALS

WKP Lab ID	Client Sample #	Location/Description	Asbestos Type(s)
1307031-21	10-19 Mastic	Level Compound Mastic, Room 149.2	**NAD**
1307031-23	10-20 Mastic	Level Compound Mastic, Room 149.2	**NAD**
1307031-25	11-21	2'x4' Ceiling Tiles, Room 149.2	**NAD**
1307031-26	11-22	2'x4' Ceiling Tiles, Room 149.1	**NAD**
1307031-27	12-23	Top Layer 12"x12" Beige Tiles, Room 100 - Side Office	**NAD**
1307031-28	12-24	Top Layer 12"x12" Beige Tiles, Office Machine	**NAD**
1307031-29	13-25	2nd Layer Tiles/Glue, Office Machine	**NAD**
1307031-30	13-26	2nd Layer Tiles/Glue, Room 100 - Side Office	**NAD**
1307031-31	14-27	3rd Layer Tiles/Glue, Room 100 - Side Office	**NAD**
1307031-32	14-28	3rd Layer Tiles/Glue, Office Machine	**NAD**

Accreditations #s: This report contains data that was produced under subcontract by ALAC, NYS-ELAP# 11605 (via ATC, NYS-ELAP# 10879).

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Sean Scales
Laboratory Director

WKP
LABORATORIES, INC.

Asbestos Analysis of Bulk Material

Test Method: TEM NYS 198.4 NOB

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LOCATION:	Port Chester School District/ 1 Tamarack Road/ Port Chester, NY/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF ANALYSIS BULK MATERIALS

WKP Lab ID	Client Sample #	Location/Description	Asbestos Type(s)
1307031-33	15-29	12"x12 Tiles/Mastic, Room 100 - Main Classroom	**NAD**
1307031-34	15-30	12"x12 Tiles/Mastic, Room 100 - Main Classroom	**NAD**

Accreditations #s: This report contains data that was produced under subcontract by ALAC, NYS-ELAP# 11605 (via ATC, NYS-ELAP# 10879).

NOTES:
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PLM bulk samples will be disposed of after 3 months unless otherwise directed by client in writing.
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Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.

Sean Scales
Laboratory Director

Appendix B

Company & Personnel Licenses

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Warren & Panzer, Engineers, P.C
2nd Floor
228 East 45th Street

New York, NY 10017

FILE NUMBER: 99-0641
LICENSE NUMBER: 28898
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 07/13/2017
EXPIRATION DATE: 07/31/2018

Duly Authorized Representative – Jeffrey Terhune PE:

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.

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

United States Environmental Protection Agency

This is to certify that

Warren & Panzer Engineers, PC

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

New York

This certification is valid from the date of issuance and expires September 08, 2018

NY-2684-5
Certification #

August 25, 2015
Issued On

Michelle Price, Chief
Lead, Heavy Metals, and Inorganics Branch

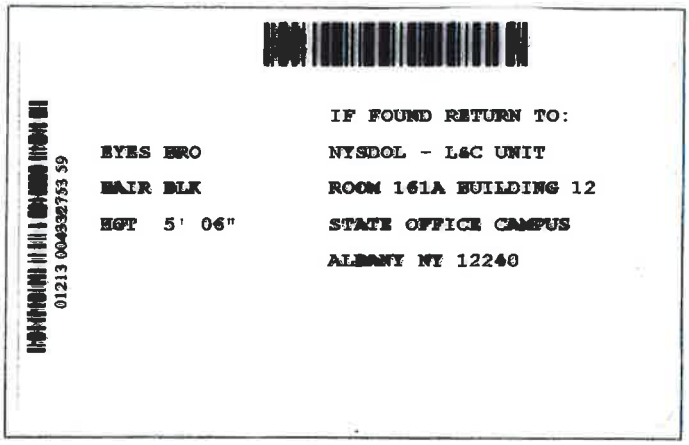
WARREN & PANZER ENGINEERS, P.C
NEW YORK STATE DEPARTMENT OF LABOR
ASBESTOS LICENSE

Robert J. Treglio

Inspector

Front of License

Back of License



Codes (Found on the back of the license):

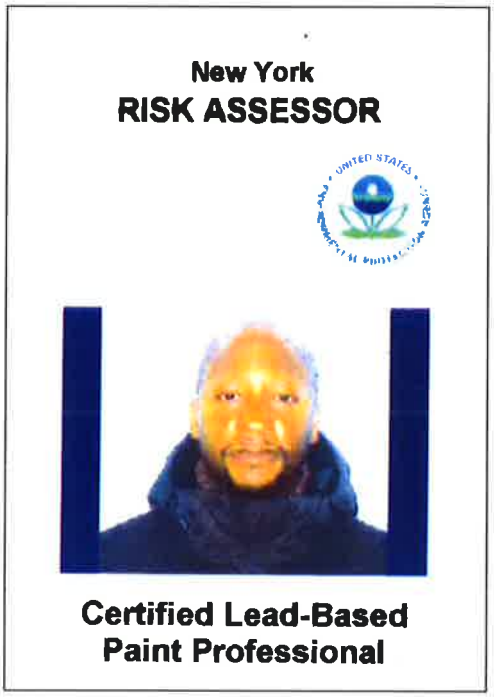
A- Asbestos Handler
B- Restricted Handler
C- Project Air Sampling Technician
D- Inspector – R III
E- Management Planner
F- Operations and Maintenance
G- Supervisor
H- Project Monitor
I- Allied Trades
I- Project Designer

WARREN & PANZER ENGINEERS

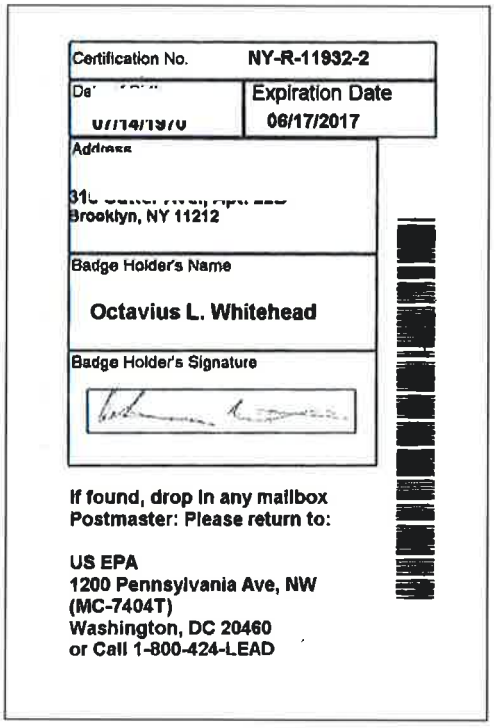
U.S. Environmental Protection Agency
New York State
Certified Lead-Based Paint Professional
Certified Risk Assessor

Octavius Whitehead

Front of License



Back of License



Appendix C

Laboratory Accreditations

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. MILENA BONEZZI
ATC GROUP SERVICES LLC
104 EAST 25TH STREET 10TH FLOOR
NEW YORK, NY 10010

NY Lab Id No: 10879

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual

Serial No.: 55817

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. JACKIE DARVISH
ATLAS ENVIRONMENTAL LABS CORP
255 W 36TH STREET SUITE #1503
NEW YORK, NY 10018

NY Lab Id No: 11999

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Metals I

Lead, Total	EPA 7000B

Sample Preparation Methods

EPA 3050B

Serial No.: 56321

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. JACKIE DARVISH
ATLAS ENVIRONMENTAL LABS CORP
255 W 36TH STREET SUITE #1503
NEW YORK, NY 10018

NY Lab Id No: 11999

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous	
Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B
Sample Preparation Methods	
	EPA 3050B

Serial No.: 56322

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. JACKIE DARVISH
ATLAS ENVIRONMENTAL LABS CORP
255 W 36TH STREET SUITE #1503
NEW YORK, NY 10018

NY Lab Id No: 11999

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Metals I		
	Lead, Total	NIOSH 7082
Miscellaneous		
	Asbestos	40 CFR 763 APX A No. III
		NIOSH 7402
	Fibers	NIOSH 7400 A RULES

Serial No.: 56323

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. LEA BENES
WKP LABORATORIES, INC.
228 EAST 45TH ST. 2ND FLOOR
NEW YORK, NY 10017

NY Lab Id No: 12012

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

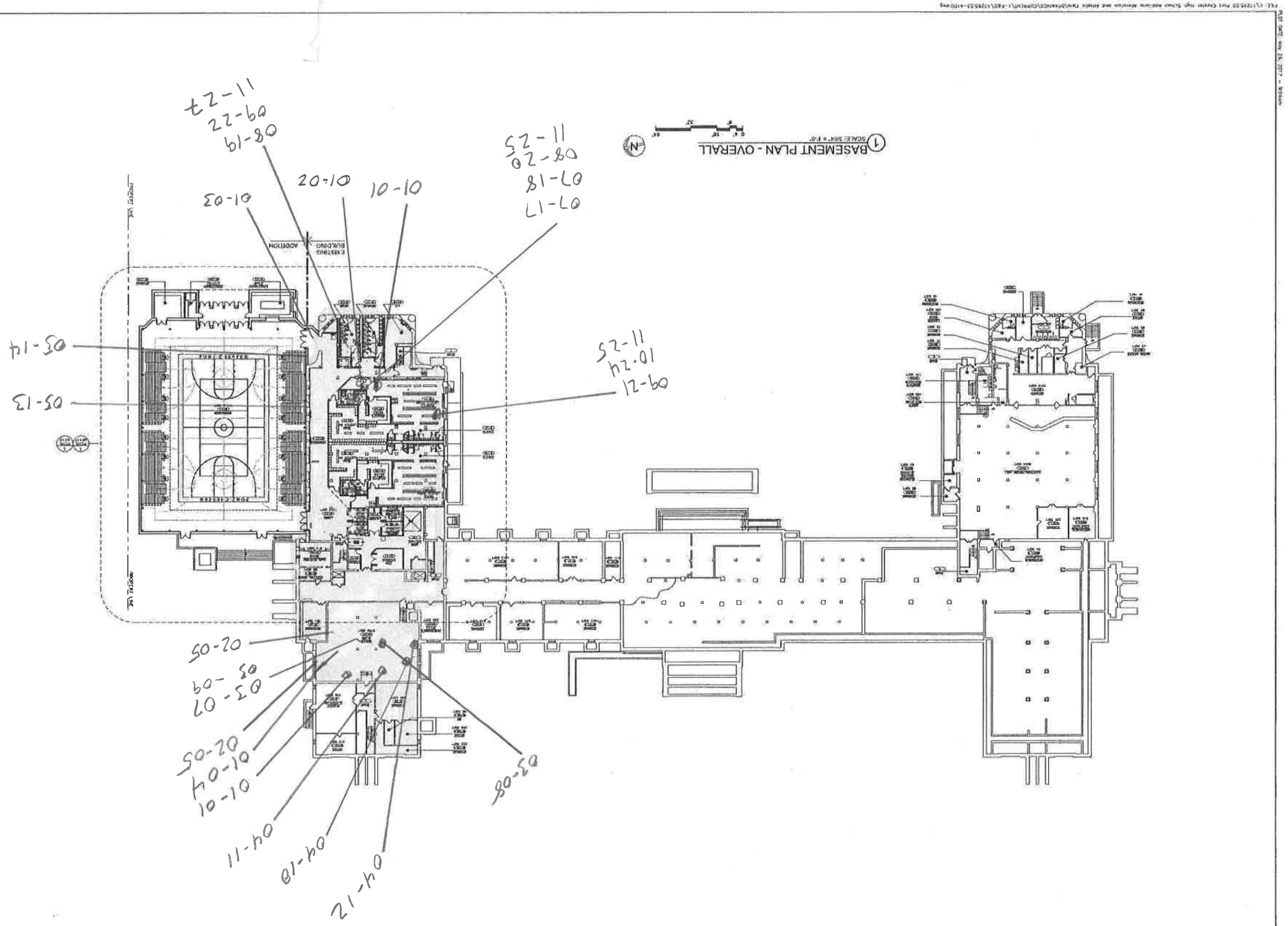
Asbestos in Friable Material	Item 198.1 of Manual
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)

Serial No.: 56340

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Appendix D

Sample Drawing Location

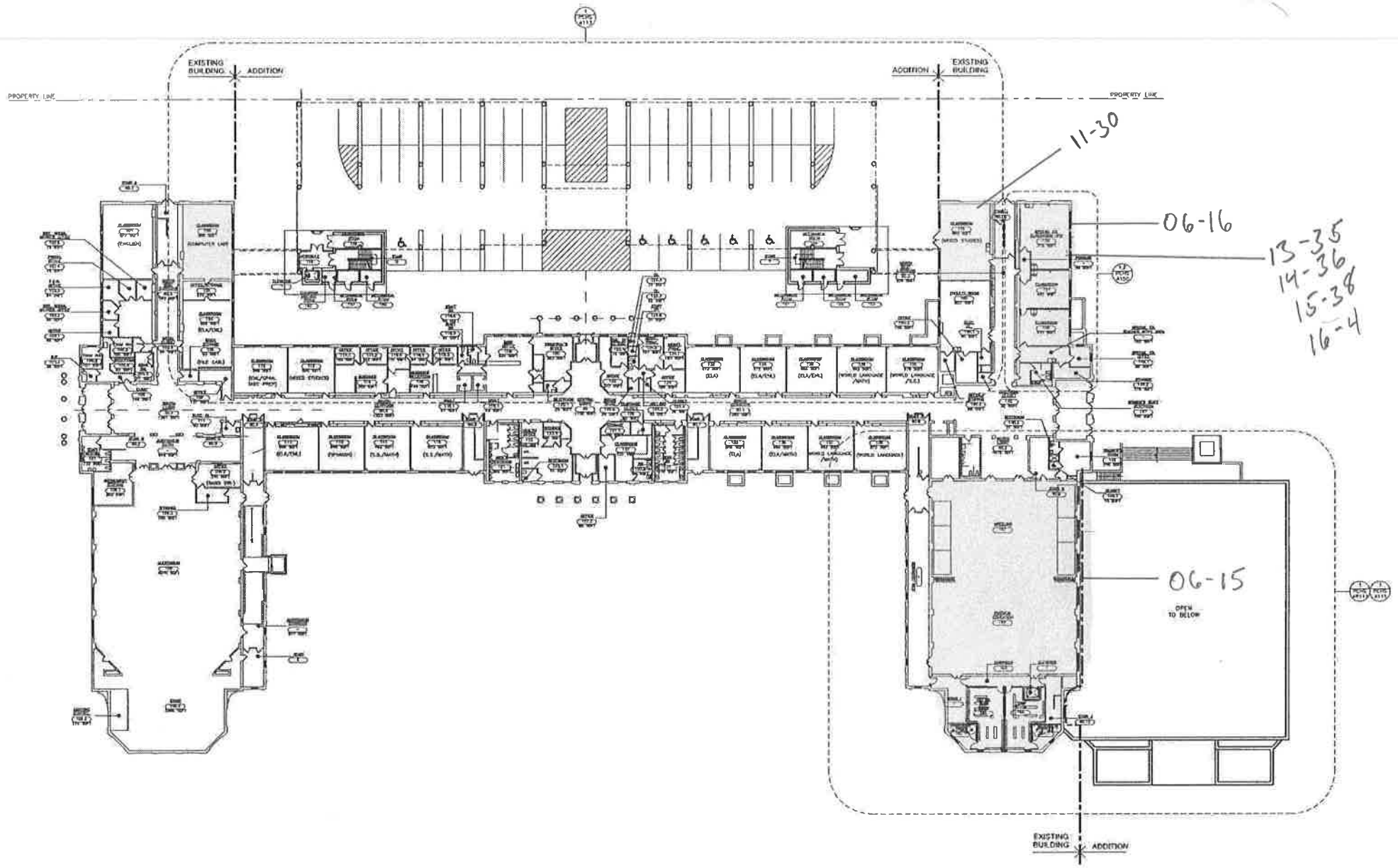


FULLER D'ANGELO P.C.
ARCHITECTS PLANNERS

PROGRESS DRAWING
NOT FOR CONSTRUCTION

DRAWN BY	12295.03
AS NOTED	A100
CHECKED BY	PCHS
DATE	FAD

PLOT DATE	
PROJECT NO.	
DRAWN BY	
CHECKED BY	



1 FIRST FLOOR PLAN - OVERALL
SCALE: 3/64" = 1'-0"

0 4' 16' 64'
8' 32'

PLOT DATE: Mar 28, 2017 - 11:45am

FILE: H:\17295.03 Port Chester High School additions Alteration and Athletic Field\DRAWINGS\CURRENT\1-FBD\17295.03-A101.dwg

FULLER D'ANGELO P.C.

ARCHITECTS PLANNERS

PROGRESS DRAWING
Mar 28, 2017 - 11:45am

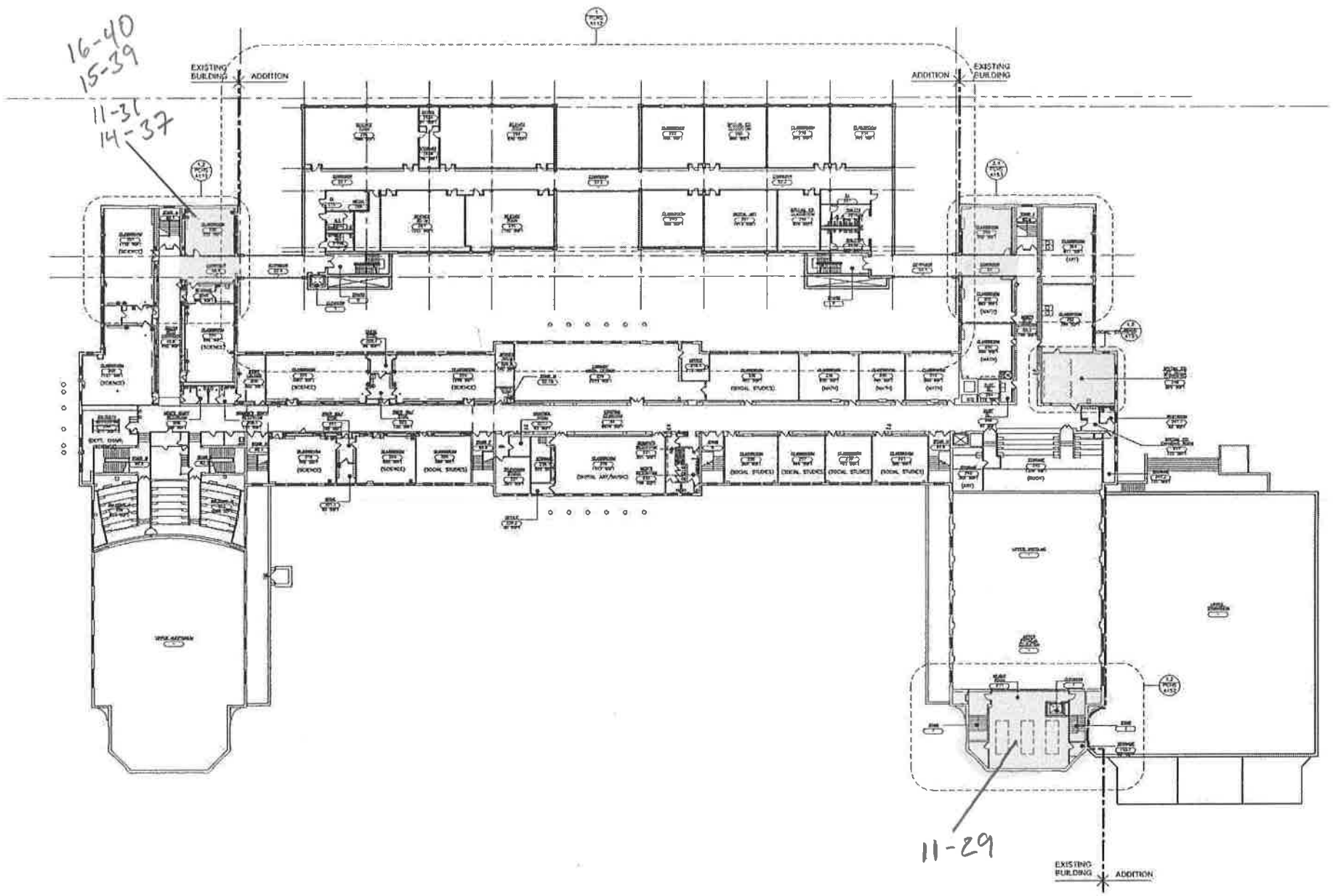
AS NOTED

PCHS A101

DRAWN BY: F&D

CHECKED BY: F&D

REF. NO.: 17295.03



1 SECOND FLOOR PLAN - OVERALL
SCALE: 3/64" = 1'-0"

FULLER D'ANGELO P.C.

ARCHITECTS PLANNERS

PROGRESS DRAWING

SCALE	AS NOTED
DRAWN BY	F&D
CHECKED BY	F&D
DWG NO.	PCHS A102
JOB NO.	17295.03

PLOT DATE: May 25, 2017 - 9:43am

F:\E. F\17295.03 Port Chester High School Additions Alteration and Athletic Fields\DRAWINGS\CURRENT\F-F&D\17295.03-A102-103.dwg

ENVIRONMENTAL CONSULTING AND TECHNICAL SERVICES

Limited XRF Lead Based Paint Survey

PROJECT #:
065.01.69

DATE:
September 25th, 2018

CLIENT:
Port Chester-Rye UFSD
113 Bowman Avenue
Port Chester, NY 10573

LOCATION:
Port Chester High School
1 Tamarack Road
Port Chester, NY 10573

PROJECT COMPLETION DATE:
October 31 ,2018

warrenpanzer
environmental management consulting services

LIMITED XRF LEAD BASED PAINT SURVEY

1 Tamarack Road, Port Chester N.Y. 10573

TABLE OF CONTENTS

LIMITED XRF LEAD BASED PAINT SURVEY

1 Tamarack Road, Port Chester N.Y. 10573

Introduction

On September 25, 2018, Warren & Panzer Engineers, P.C. conducted a Lead-Based Paint (LBP) inspection of exterior fence and window sill / window frame for the upper gym, girl's locker room, old boy's locker room, team Locker room, coaches bathroom, basement storage room, weight lifting room and bathroom at the Port Chester High School, 1 Tamarack Road, Port Chester, NY 10573. The proposed scope of work was provided by Port Chester Rye Union Free School District. The LBP inspection was conducted to determine if the impacted structures are covered with LBP. The inspection was conducted by Mr. Alexander Rukasov, certified in the use of RMD LPA-1 X-Ray Fluorescence analyzer.

The purpose of this investigation was to assess if building components being affected by scope of work contain actionable quantities of lead-based paint. The following report summarizes the results of our findings.

Testing Procedures

The LBP inspection involved the use of an RMD LPA-1 spectrum X-Ray Fluorescence Analyzer (XRF). Both the United States Department of Housing and Urban Development (HUD) and the New York City Department of Health (NYCDOH) recommend XRF analysis for inspection of lead in paint.

For quality control, the XRF instrument was calibrated using a U.S. Department of Commerce National Institute of Standards and Technology (NIST) Level III 1.9 mg/cm2 lead-based paint film. For each calibration, three (3) XRF readings were taken on the paint film. The average of these three (3) readings was then subtracted from the known lead content in the paint film. The difference was compared with an Environmental Protection Agency (EPA)-approved tolerance range. Such calibration procedures were conducted at the start and at the end of the work day.

XRF readings were taken of each painted testing combination. A testing combination includes the building component, substrate and paint color. Results were then classified as positive, negative or inconclusive. Under HUD Guidelines, the definition of LBP by XRF testing is 1.0 mg/cm2. The XRF was operated in "Quick Mode" for this project. In Quick Mode, the measurement time is determined by the LPA-1 Analyzer to achieve a 95% confidence measurement compared to an action level (1.0 mg/cm2).

XRF readings were taken from typical interior building components (i.e., int. wall) of the school. In the event that an inconclusive XRF reading is recorded paint chip sample is collected and analyzed using Flame Atomic Absorption Spectrometry (AAS) methodology to verify the reading that fell within the inconclusive range of the spectrum analyzer. New York City Department of Health and HUD define LBP as any paint film with a lead content equal to or greater than 0.5% by weight when analyzed by laboratory methods.

Findings

Readings of lead-based paint as measured by an XRF analyzer were compared to the standard established by the United States Department of Housing and Urban Development which is 1.0 milligrams per square centimeter (mg/cm2). Results were then classified as positive, negative or inconclusive.

LIMITED XRF LEAD BASED PAINT SURVEY

1 Tamarack Road, Port Chester N.Y. 10573

A total of thirty-nine (39) readings were taken during the inspection plus nine (9) calibration readings, including calibration checks. Of the 39 readings taken several of the locations were found to be equal to or greater than the standard of 1.0 mg/cm2. XRF testing results are summarized in the following Table.

Appendix A – XRF Field Data Sheet and RMD LPA-1 Performance Characteristic Sheet

All positive readings are highlighted bold.

XRF READING NUMBER	SAMPLE LOCATION	Substrate	Condition	Color	XRF READING
1	Calibration	Calibration	Calibration	Calibration	1.0
2	Calibration	Calibration	Calibration	Calibration	0.9
3	Calibration	Calibration	Calibration	Calibration	1.0
4	**Exterior Fence**	**Metal**	**Intact**	**Black**	**4.3**
5	**Exterior Fence**	**Metal**	**Intact**	**Black**	**1.9**
6	**Exterior Fence**	**Metal**	**Intact**	**Black**	**1.8**
7	**Exterior Pole**	**Metal**	**Intact**	**Black**	**>9.9**
8	**Exterior Pole**	**Metal**	**Intact**	**Black**	**>9.9**
9	Calibration	Calibration	Calibration	Calibration	1.1
10	Calibration	Calibration	Calibration	Calibration	1.2
11	Calibration	Calibration	Calibration	Calibration	1.0
12	**Basement, Room B101.1**	**Wood Window Frame**	**Poor**	**Beige**	**3.9**
11	**Basement, Room B101.1**	**Wood Window Frame**	**Poor**	**Beige**	**4.3**
12	**Basement, Room B101.1**	**Wood Window Frame**	**Poor**	**Beige**	**2.2**
13	B119.1 Coach Restroom	Window Sill Metal	Intact	Beige	0.1
14	B119.1 Coach Restroom	Window Sill Metal	Intact	Beige	0.4
15	B119.1 Coach Restroom	Window Frame Plaster	Intact	Beige	0.5

16	B119.1 Coach Restroom	Window Frame Plaster	Intact	Beige	0.3
17	B113 Team Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.1
18	B113 Team Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.2
19	B113 Team Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.1
20	Girls Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.1
21	Girls Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.3
22	Girls Locker Room	Metal Window Frame	Intact	Factory Paint Brown	0.1
23	Girls Locker Room	Window Sill	Intact	Not Painted Granite	--
24	**Girls Coach Room**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
25	**Girls Coach Room**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
26	**Girls Coach Room bathroom**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
27	**Girls Coach Room**	**Window Sill**	**Intact**	**Off-White**	**>9.9**
28	**Girls Coach Room bathroom**	**Window Sill**	**Intact**	**Off-White**	**>9.9**
29	**Old Boys Locker Room**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
30	**Old Boys Locker room**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
31	**Old Boys Shower Room**	**Window Frame Metal**	**Intact**	**Off-White**	**>9.9**
32	**Old Boys Locker Room**	**Window Sill**	**Intact**	**Off-White**	**>9.9**
33	**Old Boys Shower Room**	**Window Sill**	**Intact**	**Off-White**	**>9.9**

34	Upper Gym	Window Frame Metal	Intact	Factory Paint Brown	0.2
35	Upper Gym	Window Frame Metal	Intact	Factory Paint Brown	0.5
36	Upper Gym	Window Frame Metal	Intact	Factory Paint Brown	0.3
37	Upper Gym	Window Sill	Intact	Brown Wood	0.1
38	Upper Gym	Window Sill	Intact	Brown Wood	0.2
39	Upper Gym	Window sill	Intact	Brown Wood	0.1
40	**Room 143.2 Weight Room**	**Window Frame Metal**	**Intact**	**Brown**	**>9.9**
41	**Room 143.2 Weight Room**	**Window Frame Metal**	**Intact**	**Brown**	**>9.9**
42	**Room 143.2 Weight Room Bathroom**	**Window Frame Metal**	**Intact**	**Brown**	**>9.9**
43	**Room 143.2 Weight Room**	**Window Sill Wood**	**Intact**	**Brown**	**>9.9**
44	**Room 143.2 Weight Room**	**Window Sill Wood**	**Intact**	**Brown**	**>9.9**
45	**Room 143.2 Weight Room Bathroom**	**Window Sill Wood**	**Intact**	**Brown**	**>9.9**
46	Calibration	Calibration	Calibration	Calibration	1.1
47	Calibration	Calibration	Calibration	Calibration	0.9
48	Calibration	Calibration	Calibration	Calibration	1.0

Notes:

1. **Red Bold Type** denotes reading was at or above the action level (1.0 mg/cm^2 XRF or .5% by weight AAS).
2. Calibration readings do not indicate lead content and therefore, are not bolded.

Recommendations

In general, lead-based paint is not considered a hazard if it is intact and in good condition. Lead hazards arise from lead-based paint that is in peeling, flaking, or in otherwise deteriorated condition or if intact surfaces are disturbed through removal, or renovation. HUD has also identified "impact" or "friction" surfaces. Impact surfaces such as painted floors or stair treads, and friction surfaces such as windows and doors may generate lead dust through normal use. In the case of small children, "chewable" surfaces such as corners of walls, moldings, etc are also of concern.

If lead-based paint is present in the conditions described below:

- Peeling, flaking, or otherwise deteriorated
- On impact or friction Surfaces
- On chewable surfaces
- Will be disturbed through renovation or repair

Then painted components should be abated by one of the following methods:

- Removal of paint
- Replacement of affected components
- Encapsulation of LBP surfaces

The abatement method selected will depend on the quantities and types of materials. Guidelines pertinent to the handling and management of lead-based paint can be found in Attachment D. The removal, replacement, or encapsulation of materials containing lead-based paint should be performed by a licensed abatement contractor.

Conclusion

Based on inspection results, building component paint in the current scope of work that will be disturbed the following components were found to have paint that contain = or >1.0 mg/cm^2 XRF.

- **Exterior Fence and poles, basement room B101.1, girls coaches room and bathroom, old boys locker room, old boys shower room, and weight room 143.2 and associated bathroom.**

LIMITED XRF LEAD BASED PAINT SURVEY

1 Tamarack Road, Port Chester N.Y. 10573

Report Certifications

On September 25, 2018, Warren & Panzer Engineers, P.C. conducted a Lead-Based Paint (LBP) inspection of exterior fence and window sill / window frame for the upper gym, girl's locker room, old boy's locker room, team Locker room, coaches bathroom, basement storage room, weight lifting room and bathroom at the Port Chester High School, 1 Tamarack Road, Port Chester, NY 10573. The LBP inspection was conducted to determine if the impacted structures are covered with LBP. The inspection was conducted by Mr. Alexander Rukasov, certified in the use of RMD LPA-1 X-Ray Fluorescence analyzer.

We appreciate the opportunity to be of the service to NYPA. Should you have any questions or require additional information, please contact our office.

Sincerely,

Alexander Rukasov
Project Manager

Appendix A

Company & Personnel Licenses

United States Environmental Protection Agency

This is to certify that

Warren & Panzer Engineers, PC

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires September 08, 2021

LBP-2684-1

Certification #

April 11, 2018

Issued On

Michelle Price

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Alexander Rukasov

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Risk Assessor

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 28, 2021

LBP-R-I180279-1

Certification #

March 14, 2018

Issued On

John Gorman, Chief

Pesticides & Toxic Substances Branch

Appendix B

Applicable Lead Regulations

A. Applicable Regulations

The applicable regulations/guidelines for handling and management of lead-based paint include but are not limited to the following:

1. "Guidelines for the Evaluation of Lead-Based Paint Hazards in Housing", Department of Housing and Urban Development (HUD). These HUD guidelines are designed for residences and childcare facilities, where children under the age of six are likely to reside or are placed.

2. Occupational Safety and Health (OSHA) Standards and Regulations contained in 29CFR 1926.62, Lead-in-Construction Standard. These standards apply to all construction work where a contractor's employee may be occupationally exposed to lead.

3. U.S. Environmental Protection Agency's (USEPA) Resource Conservation and Recovery Act (RCRA), 40CFR Part 260. These standards may apply to the disposal of demolition debris waste generated during the course of construction/renovation.

B. Guidelines for LBP Abatement

1. It is recommended that renovation work be monitored to ascertain that activities do not disturb components where lead has been detected in paint. In the event that the scope of work is increased to include these components, applicable local and Federal regulations should be followed.

2. It is recommended that the abatement specification spell out the contractor's responsibility for meeting the requirements of OSHA Lead-in-Construction, Interim Final Rule (29 CFR Part 1926.62). OSHA's lead in construction standard applies to all construction work where an employee may be occupationally exposed to lead. Under this standard, construction includes demolition or salvage of structures where lead or materials containing lead are present.

The standard establishes maximum limits of exposure to airborne lead-containing particulates for all workers covered, including a permissible exposure limit and action level. Where initial employee exposure is at or above the action level, the employer (contractor) must collect personal air samples representative of a full work shift, including at least one sample for each shift or for the shift with the highest exposure
level for each job classification in each work area. Until the employer performs an exposure assessment and documents that employees are not exposed above the PEL, the employer must treat employees performing certain operations (including demolition) as if they were exposed above the PEL. This means providing respiratory protection, protective work clothing and equipment, change areas, hand washing facilities, biological monitoring, and training.

3. In addition to the regulatory requirements for worker protection and waste disposal measures, we recommend that adequate containment measures be included within the scope of the abatement for dust control.

Such dust control measures shall prevent the spreading of lead dust beyond the boundaries of the construction area and shall ensure the removal of all lead dust from within the work area. Such measures may include covering doors, windows and any other openings with polyethylene plastic sheeting (poly) prior to demolition and use of tools fitted with HEPA.

To ensure contract compliance, we recommend that air samples be collected to monitor the effectiveness of the containment measures. After lead abatement, we recommend that wipe samples be taken within the initial work area to ensure that the area was satisfactorily cleaned by the abatement crew.

It is recommended that the demolition specification spell out the contractor's responsibility for meeting these requirements. Lead is considered a hazardous material by virtue of its toxic characteristics. Under RCRA, any waste material that when tested by Toxicity Characteristics Leachate Procedure (TCLP) results in a leachate lead concentration of five (5) parts per million or greater must be disposed of at an EPA licensed hazardous waste facility.

C. Guidelines for Waste Disposal

The finer demolition debris and paint chips that result from demolition of components with measurable quantities of lead generally fail TCLP. Such debris can be tested by TCLP or can be assumed hazardous waste and disposed of accordingly. If the scope of work is increased to include removal of actionable building components, we recommend that a TCLP test be performed on one typical component (e.g. metal, sheetrock, masonry, etc.) to determine proper disposal for all similar components. The approximate cost of one TCLP test is $100/sample.

ENVIRONMENTAL CONSULTING AND TECHNICAL SERVICES

Limited Asbestos Survey

PROJECT #:
065.01.64

DATE:
September 20, 2018

CLIENT:
Port Chester-Rye UFSD
113 Bowman Avenue
Port Chester, NY 10573

LOCATION:
Port Chester High School
1 Tamarack Road/Auditorium
Port Chester, NY 10573

PROJECT COMPLETION DATE:
September 20, 2018

warrenpanzer
environmental management consulting services
228 East 45th Street
New York, NY 10017
T. 212.922.0077
F. 212.922.0630
info@warrenpanzer.com

TABLE OF CONTENTS

LIMITED ASBESTOS SURVEY
1 Tamarack Road, Interior of Retaining Wall, Port Chester New York 10573

On August 17, 2017 Warren & Panzer Engineers, P.C. (Warren Panzer) conducted a limited asbestos survey of the Interior of Retaining Wall located at 1 Tamarack Road, Port Chester New York 10573. The purpose of this limited asbestos survey was to determine the presence or absence of Asbestos-Containing Materials (ACM) located in the areas that would be subject to impact during upcoming renovations.

During the limited asbestos survey, Warren Panzer identified several suspect materials that might contain asbestos. These materials were as follows:

Homogenous Material	**Location**	**Material**	**Asbestos Content**
01-01	Interior of Retaining Wall	Tar	NAD
01-02	Middle of Interior Wall	Tar	NAD
01-03	By Expanding Joint	Tar	NAD
02-04	Upper Retaining Wall Coping Stone	Expansion Joint	NAD
02-05	Upper Retaining Wall Coping Stone	Expansion Joint	NAD
02-06	Upper Retaining Wall Coping Stone	Expansion Joint	NAD
03-07	Lower Retaining Wall	Caulk Joint	NAD
03-08	Lower Retaining Wall	Caulk Joint	NAD
03-09	Lower Retaining Wall	Caulk Joint	NAD
04-10	Flag Plata Retaining Wall	Expanding Joint	NAD
04-11	Interior	Expanding Joint	NAD
04-12	Between Slab	Expanding Joint	NAD
05-13	Upper Retaining Wall	Mortar	NAD
05-14	Upper Retaining Wall	Mortar	NAD
05-15	Lower Retaining Wall	Mortar	NAD

NAD: NO ASBESTOS DETECTED
NAD-NVD: NO ASBESTOS DETECTED-NO VERMICULITE DETECTED
NA/PS: NOT ANALYZED POSITIVE STOP
BOLD: ASBESTOS-CONTAINING MATERIAL

LIMITED ASBESTOS SURVEY
1 Tamarack Road, Interior of Retaining Wall, Port Chester New York 10573

Samples were collected of all suspect material and sent to WKP Laboratories located at 228 East 45th Street, NY for analysis. WKP's laboratory is accredited by the New York State Department of Health (ELAP No.12012).

All bulk samples were analyzed by Polarized Light Microscopy (PLM) with dispersion staining as described by the Interim Method of the Determination of Asbestos in Bulk Insulation, Federal Register/Volume 47, No. 103/May 27, 1982. It should be noted that some ACM may not be accurately identified and/or quantified by PLM. As an example, the original fabrication of non-friable organically bound (NOB) materials, such as vinyl floor tile materials, routinely involved milling of asbestos fibers to extremely small sizes. As a result, these fibers may go undetected under the standard PLM method. Under these circumstances, ATC (ELAP 10879) conducted additional bulk sample analysis via Transmission Electron Microscopy (TEM), which is required under applicable State of New York regulations for a more definitive analysis of NOB materials whenever PLM results are inconclusive.

The results of the visual inspection and bulk sample analysis determined that none of the following material are ACM:

Appendix A contains copy of the laboratory reports and chain-of-custody forms for your records.

We appreciate the opportunity to be of the service to Port Chester-Rye UFSD. Should you have any questions or require additional information, please contact our office.

Sincerely,

Alex Rukasov
Project Manager
NYS DOL Certified Asbestos Inspector / NYC DEP Certified Asbestos Investigator

Appendix A

Laboratory Reports & Chain of Custody Forms

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/17/2017
WKP Log I.D. #:	1306998	DATE RECEIVED:	08/17/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/18/2017
		REPORT DATE:	08/18/2017
Client Job:	065.01.64	REVISED:	
Charge Code:	065.01.64		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
01-01	1306998-001	Tar, Interor of Retaining Wall, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
01-02	1306998-002	Tar, Middle of Interior Wall, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
01-03	1306998-003	Tar, By Expanding Joint, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
02-04	1306998-004	Expansion Joint - Soft, Upper Retaining Wall Coping Stone, Non-Fibrous, Gray/Beige, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
02-05	1306998-005	Expansion Joint - Soft, Upper Retaining Wall Coping Stone, Non-Fibrous, Gray/Beige, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
02-06	1306998-006	Expansion Joint - Soft, Upper Retaining Wall Coping Stone, Non-Fibrous, Gray/Beige, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Client:	Warren & Panzer Engineer's. P.C.	TURNAROUND TIME:	Standard
WKP File #:	501	DATE COLLECTED:	08/17/2017
WKP Log I.D. #:	1306998	DATE RECEIVED:	08/17/2017
Attention:	Greg Chomenko	ANALYSIS DATE:	08/18/2017
		REPORT DATE:	08/18/2017
Client Job:	065.01.64	REVISED:	
Charge Code:	065.01.64		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
03-07	1306998-007	Caulk/Joint, Lower Retaining Wall, Non-Fibrous, Blue/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
03-08	1306998-008	Caulk/Joint, Lower Retaining Wall, Non-Fibrous, Blue, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
03-09	1306998-009	Caulk/Joint, Lower Retaining Wall, Non-Fibrous, Blue/Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
04-10	1306998-010	Expanding Joint, Flag Plata - Retaining Wall, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
04-11	1306998-011	Expanding Joint, Interior, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				
04-12	1306998-012	Expanding Joint, Between Slab, Non-Fibrous, Black, Non-homogeneous Note: NOB Sample - Recommend TEM	None Detected	Inconclusive			Non-Fibrous Material	100%
			Total % Asbestos:	Inconclusive				

WKP
LABORATORIES, INC.

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
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Attention:	Greg Chomenko	ANALYSIS DATE:	08/18/2017
		REPORT DATE:	08/18/2017
Client Job:	065.01.64	REVISED:	
Charge Code:	065.01.64		
Location:	Port Chester School District/ 1 Tamarack Road/ Port Chester/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF BULK ANALYSIS BY PLM (ELAP 198.1/ 198.6)

Client #	Lab ID #	Sample Description	Asbestos Type(s)	(%)	Non-Asbestos Fibers	(%)	Non-Fibrous Materials	(%)
05-13	1306998-013	Mortar, Upper Retaining Wall, Non-Fibrous, Gray, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
05-14	1306998-014	Mortar, Upper Retaining Wall, Non-Fibrous, Gray, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				
05-15	1306998-015	Mortar, Lower Retaining Wall, Non-Fibrous, Gray, Non-homogeneous	None Detected				Non-Fibrous Material	100%
			Total % Asbestos:	No Asbestos Detected				

ANALYSIS / ACCREDITATIONS: Bulk sample analysis by Polarized Light Microscopy, ELAP Method 198.1 and 198.6. NYS ELAP Laboratory ID # 12012 and NVLAP Lab Code 101950-0.

NOTES:

1. NAD denotes NO ASBESTOS DETECTED.
2. Percentages are calculated using the EPA equivalent Stratified Point-Count Method.
3. The samples in this report were not collected by WKP Laboratories, Inc.
4. This report relates only to the samples tested. It may not be used by the client to claim project endorsement by NVLAP, or any other agency of the U.S. government. The report, or certificate, shall not be reproduced, except in full, without the written approval of the laboratory.
5. All inhomogeneous layers of the bulk sample are analyzed separately.
6. PLM bulk samples will be disposed of after 3 months unless otherwise directed by client in writing.
7. * Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.
8. Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.
9. NY ELAP Item 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite.

Sean Scales
Laboratory Analyst

Sean Scales
Laboratory Director

Report Prepared by:
Sean Scales

warrenpanzer environmental engineering
228 East 45th Street, 2nd Floor
New York, New York 10017
T: 212.922.0077 | F: 212.922.0630
E: wplabreports@warrenpanzer.com

CLIENT NAME: Port Chester School District
PROPERTY ADDRESS: 1 Tamarack Rd. Port Chester
SURVEY LOCATION: High School
WP PROJECT #: 065.01.64

☒ PLM-EPA 600/M4/82/020
☒ PLM NOB-NYS 198.1/198.6
☒ TEM NOB - NYS 198.4

1306998

BULK SAMPLE - CHAIN-OF-CUSTODY FORM

COMMENTS:

Turnaround Time: RUSH (24 HR) 48 HR

QTY	Condition	Sample #		Location	Material Description	Results (lab use only) PLM Friable	PLM NOB	TEM NOB	AAS
500 sf/lot	Fair.	01	01	Interior of retaining wall.	TAR.				
			02	Middle of Interior wall.					
			03	by expanding Joint					
275 lin/ft		02	04	Upper retaining wall coping stone	Expansion Soft Joint				
			05						
			06						
80 lin/ft		03	07	Lower Retaining Wall.	Caulk / Joint				
			08						
			09						
1100 sq/ft		04	10	Flag Plaza, retaining wall.	Expanding Joint				
			11	interior					
			12	between slab.					
		05	13	Upper retaining wall	mortar.				
			14						
			15	lower retaining wall					

Sampled by: A. Rellevera
Signature:
Date: 08/17/17
Time: 8:00.

Relinquished by: A. Rellevera
Signature
Date: 08/17/17
Time:

Received by: Sean J Scales
Signature: Sean J Scales
Date: 08/17/17
Time: 5:30 PM

Analyzed by: Sean J Scales
Signature: Sean J Scales
Date: 08/18/2017
Time: 12:30 PM

WKP LABORATORIES, INC.

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Asbestos Analysis of Bulk Material

Test Method: TEM NYS 198.4 NOB

		TAT:	24 HR
CLIENT:	Warren & Panzer Engineer's P.C.	DATE COLLECTED:	8/17/2017
WKP LOG I.D.	1306998	RECEIVED DATE:	8/17/2017
ATTENTION:	Greg Chomenko	ANALYSIS DATE:	8/20/2017
CLIENT JOB:	065.01.64	REPORT DATE:	8/20/2017
LOCATION:	Port Chester School District/ 1 Tamarack Road/ Port Chester/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF ANALYSIS BULK MATERIALS

WKP Lab ID	Client Sample #	Location/Description	Asbestos Type(s)
1306998-01	01-01	Tar, Interor of Retaining Wall	NAD
1306998-02	01-02	Tar, Middle of Interior Wall	**<1% Chrysotile**
1306998-03	01-03	Tar, By Expanding Joint	NAD
1306998-04	02-04	Expansion Joint - Soft, Upper Retaining Wall Coping Stone	NAD
1306998-05	02-05	Expansion Joint - Soft, Upper Retaining Wall Coping Stone	NAD
1306998-06	02-06	Expansion Joint - Soft, Upper Retaining Wall Coping Stone	NAD
1306998-07	03-07	Caulk/Joint, Lower Retaining Wall	NAD
1306998-08	03-08	Caulk/Joint, Lower Retaining Wall	NAD
1306998-09	03-09	Caulk/Joint, Lower Retaining Wall	NAD
1306998-10	04-10	Expanding Joint, Flag Plata - Retaining Wall	NAD

Accreditations #s: This report contains data that was produced under subcontract by ALAC, NYS-ELAP# 11605 (via ATC, NYS-ELAP# 10879).

NOTES:
NAD denotes- NO ASBESTOS DETECTED / Inconclusive. N/A - Not Analyzed.
The samples in this report were not collected by WKP Laboratories, Inc. Therefore bears no responsibility for sample collection activities or analytical method limitations
This report relates only to the samples tested. It may not be used by the client to claim project endorsement by NVLAP, or any other agency of the U.S. government.
The report, or certificate, shall not be reproduced, except in full, without the written approval of the laboratory
All non-homogeneous layers of the bulk sample are analyzed separately.
PLM bulk samples will be disposed of after 3 months unless otherwise directed by client in writing.
* Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing
Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.

Sean Scales
Laboratory Director

WKP LABORATORIES, INC.

228 East 45th Street 2nd Floor
New York, NY 10017
Tel: (212) 922-0689
Fax: (212) 922-0630

Asbestos Analysis of Bulk Material

Test Method: TEM NYS 198.4 NOB

		TAT:	24 HR
CLIENT:	Warren & Panzer Engineer's P.C.	DATE COLLECTED:	8/17/2017
WKP LOG I.D.	1306998	RECEIVED DATE:	8/17/2017
ATTENTION:	Greg Chomenko	ANALYSIS DATE:	8/20/2017
CLIENT JOB:	065.01.64	REPORT DATE:	8/20/2017
LOCATION:	Port Chester School District/ 1 Tamarack Road/ Port Chester/ High School	COLLECTED BY:	Alex Rukasov

SUMMARY OF ANALYSIS BULK MATERIALS

WKP Lab ID	Client Sample #	Location/Description	Asbestos Type(s)
1306998-11	04-11	Expanding Joint, Interior	NAD
1306998-12	04-12	Expanding Joint, Between Slab	NAD

Accreditations #s: This report contains data that was produced under subcontract by ALAC, NYS-ELAP# 11605 (via ATC, NYS-ELAP# 10879).

NOTES:
NAD denotes- NO ASBESTOS DETECTED / Inconclusive. N/A - Not Analyzed.
The samples in this report were not collected by WKP Laboratories, Inc. Therefore bears no responsibility for sample collection activities or analytical method limitations
This report relates only to the samples tested. It may not be used by the client to claim project endorsement by NVLAP, or any other agency of the U.S. government.
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All non-homogeneous layers of the bulk sample are analyzed separately.
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Quality control data (Including 95% confidence limits,laboratory / analysis accuracy and precision) is available upon request.

Sean Scales
Laboratory Director

Appendix B

Company & Personnel Licenses

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Warren & Panzer, Engineers, P.C
2nd Floor
228 East 45th Street

New York, NY 10017

FILE NUMBER: 99-0641
LICENSE NUMBER: 28898
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 06/22/2018
EXPIRATION DATE: 07/31/2019

Duly Authorized Representative – Jeffrey Terhune PE:

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.

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

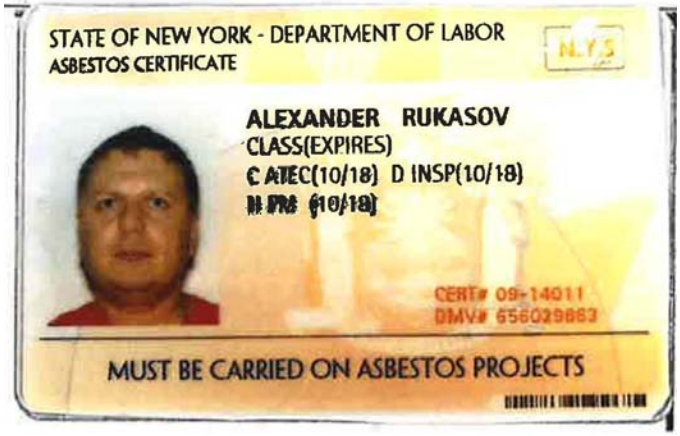
warrenpanzer

New York State Department of Labor
Asbestos License

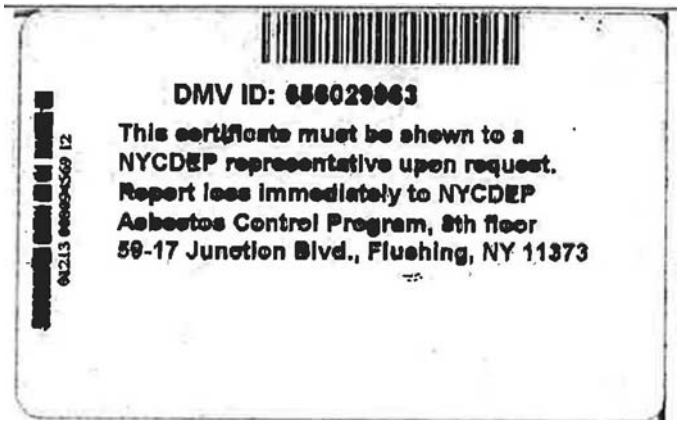
Alexander Rukasov

Project Manager

Front of License



Back of License



Codes (Found on the back of the license):

A- Asbestos Handler
B- Restricted Handler
C- Project Air Sampling Technician
D- Inspector – R III
E- Management Planner
F- Operations and Maintenance
G- Supervisor
H- Project Monitor
I- Allied Trades
I- Project Designer

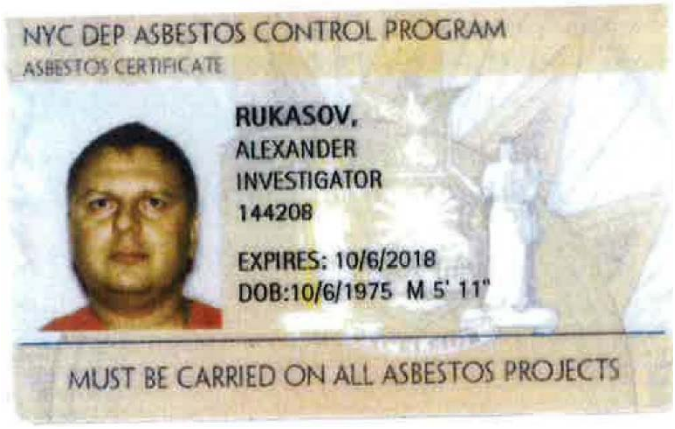
warrenpanzer

New York City Department of Environmental Protection
Asbestos License

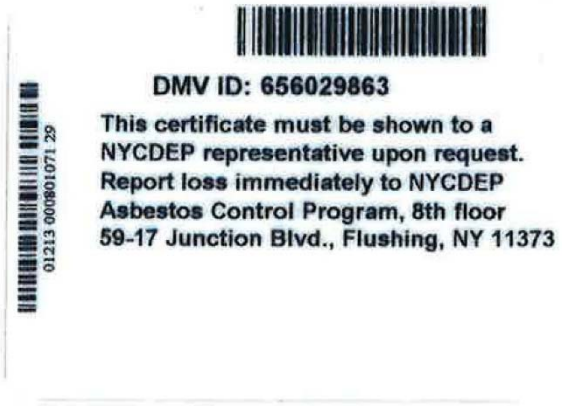
Alexander Rukasov

Project Manager

Front of License



Back of License



Appendix C

Laboratory Accreditations

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2019
Issued April 01, 2018

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. SEAN SCALES
WKP LABORATORIES, INC.
228 EAST 45TH ST. 2ND FLOOR
NEW YORK, NY 10017

NY Lab Id No: 12012

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)

Serial No.: 58114

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2019
Issued April 01, 2018

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. MILENA BONEZZI
ATC GROUP SERVICES LLC
104 EAST 25TH STREET 8TH FLOOR
NEW YORK, NY 10010

NY Lab Id No: 10879

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual

Serial No.: 57598

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Part 155 Regulations

Section 155.5 Uniform Safety Standards for School Construction and Maintenance Projects Disclaimer

(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.

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.